

March  
2009

# digit Fast Track to Digital photography

Image properties

Shooting settings

Camera features

Formats

How to shoot

Shooting Modes

Focussing

Photography

Transfer and Printing

Camera Accessories

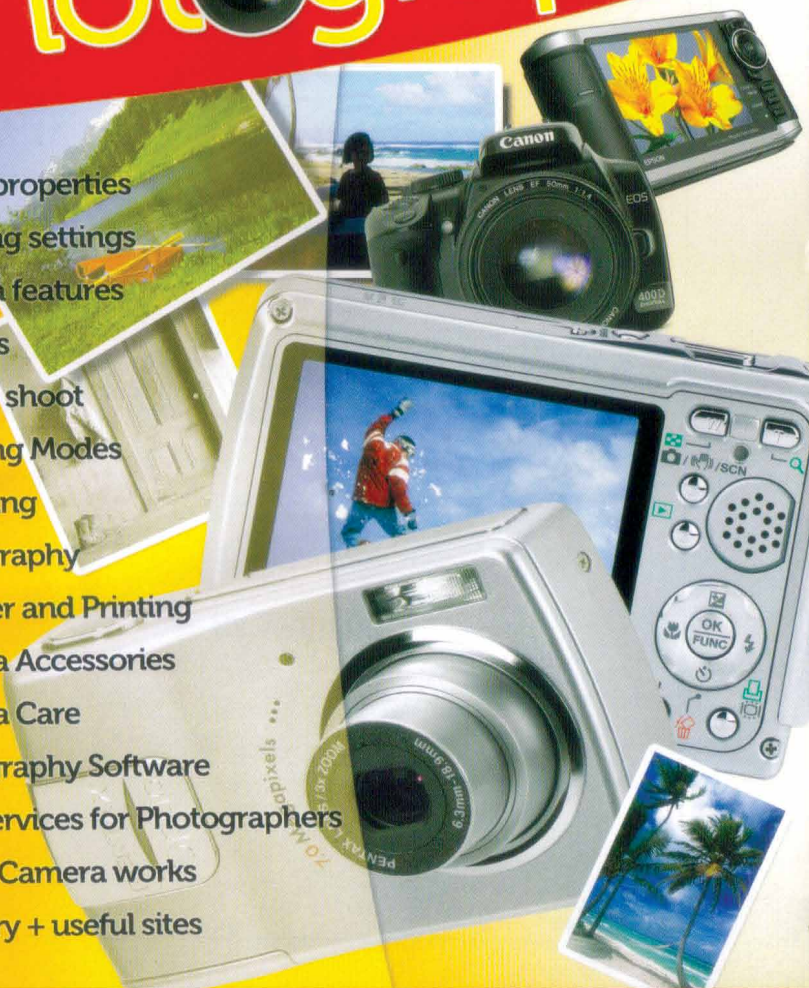
Camera Care

Photography Software

Web Services for Photographers

How a Camera works

Glossary + useful sites



YOUR HANDY GUIDE TO EVERYDAY TECHNOLOGY

# **Fast Track to Digital Photography**

By Team Digit

# Credits

## The People Behind This Book

### EDITORIAL

Editor-in-chief	Edward Henning
Assistant Editor	Robert Sovereign-Smith
Head-Copy Desk	Nash David
Writer	Aditya Madanapalle

### DESIGN AND LAYOUT

Layout Design	MV Sajeew, Soumya Mohanty
Cover Design	Andre Rodrigues

© 9.9 Interactive Pvt. Ltd.

Published by 9.9 Interactive

No part of this book may be reproduced, stored in a retrieval system or transmitted in any form or by any means without the prior written permission of the publisher.

March 2009

Free with Digit. Not to be sold separately. If you have paid separately for this book, please email the editor at [editor@thinkdigit.com](mailto:editor@thinkdigit.com) along with details of location of purchase, for appropriate action.

## Introduction

Not too far back in history, before the advent of digital photography, each photo was unique and special. A *photo* was the actual card, something you could carry in your wallet, frame and keep on your desk, or hang on a wall. Albums used to be meticulously preserved. Often, photographers used to insert handwritten captions on the back of the photo describing the event or particulars of the photograph.

Digital photography has changed how we handle photos, how we interact with them and even how we read them. What was once a costly affair, is now quite affordable. Anyone with a camera these days can claim to be an amateur photographer. This is, in a way, good. People are increasingly getting interested in photography. However, this does backfire at times as well, especially considering that the proliferation of images has reduced the ratio of inspiring shots to the run-of-the-mill ones that you come across everywhere.

Although veterans still hold out with film, and at times even black-and-white film, it would not be fair to classify all kinds of digital photography as being sub-standard or without merit.

Photography in the past century was a time-consuming process. Back then, there were no LCD screens on cameras to instantly know how your photos would turn out. It had to be the tough way out – trial and error. Enthusiasts and amateurs alike had to wait for as much as a month, probably more, to finish a film roll and develop it into hard copies. Photography was rather actively pursued back then – each photo delicately sought after, because it was a distinct image of a particular object, the individuality of each picture stood out.

Moreover, each shot had to be planned, the camera had to be understood, the lighting conditions evaluated, before the photographer even dared to open the shutter and decide to capture a particular scene. These are some of the things that are missed in these days of digital cameras. It took years of practice to make a half-decent photographer in the good old days of film, and digital cameras are now changing that.

# CONTENTS

<b>Chapter 1</b>	<b>Image Properties</b>	<b>09</b>
1.1	Megapixel	09
1.2	Image Parameters	10
1.3	Shooting Modes	15
1.4	White Balance	22
<b>Chapter 2</b>	<b>Shooting Settings</b>	<b>25</b>
2.1	Aperture priority mode	25
2.2	Aperture Size (f-number)	29
2.3	Shutter Speed	33
2.4	Shutter Priority Mode	36
2.5	ISO Rating	38
<b>Chapter 3</b>	<b>Camera Features</b>	<b>41</b>
3.1	Image Stabilisation	41
3.2	Exposure Compensation	44
3.3	Flash sync and intensity	49
<b>Chapter 4</b>	<b>File Formats</b>	<b>53</b>
4.1	RAW	53
4.2	JPEG	54
4.3	TIFF	55
<b>Chapter 5</b>	<b>How to shoot</b>	<b>56</b>
5.1	Macro	56
5.2	Telescopic	57
5.3	Portrait	58
5.4	Landscape	59
5.5	Night	60
5.6	Action	61
5.7	Architectural	62
<b>Chapter 6</b>	<b>Shooting Modes</b>	<b>63</b>
6.1	Single shoot	63
6.2	Burst Modes	64
6.3	Multiple shooting mode	65
6.4	Self timer	65
<b>Chapter 7</b>	<b>Focussing</b>	<b>66</b>
7.1	Focussing modes - Continuous / Single focus	66
7.2	Auto Focus - Spot focus/Area focus/ multi-spot focus	67
7.3	Light metering - spot / evaluative	68
7.4	Manual Focus	69

<b>Chapter 8</b>	<b>Time-Lapse</b>	<b>70</b>
8.1	HDR	73
8.2	Panoramas	75
<b>Chapter 9</b>	<b>Transfer and Printing</b>	<b>78</b>
9.1	USB / Firewire	78
9.2	Bluetooth / WLAN	79
9.3	PictBridge	80
9.4	AV-out / HDMI	82
<b>Chapter 10</b>	<b>Camera Accessories</b>	<b>83</b>
10.1	Tripod	83
10.2	Filters	84
10.3	Memory - SD / MMC / XD / CompactFlash	85
10.4	Lens	86
10.5	Lighting	87
10.6	External Flash	88
10.7	Portable Image-viewers	89
10.8	Remote control	90
10.9	Batteries	90
10.10	Battery Chargers	92
<b>Chapter 11</b>	<b>Camera Care</b>	<b>93</b>
11.1	Lens cleaning and maintenance	93
11.2	Carry bag	95
11.3	Microfiber cloth	95
<b>Chapter 12</b>	<b>Software</b>	<b>96</b>
12.1	Picasa	96
12.2	Adobe Photoshop	97
12.3	Adobe Lightroom	99
12.4	Photography Software for Linux	100
<b>Chapter 13</b>	<b>Web services for photographers</b>	<b>102</b>
13.1	Flickr	102
13.2	PBase	107
13.3	Picasa Web (picasaweb.google.com)	109
13.4	Smugmug (www.smugmug.com)	111
13.5	Snapfish (www.snapfish.com)	112
<b>Chapter 14</b>	<b>Image Properties</b>	<b>116</b>
14.1	Difference between a P&S and a dSLR	116
14.2	Kinds of Sensors	121
14.3	Image Compression	126
14.4	Full-frame Cameras	127
14.5	Sensors size and image resolution	129
<b>Chapter 15</b>	<b>Glossary</b>	<b>132</b>

# Image properties

## 1.1 Megapixel

Most digital camera users, brag about their megapixel count, which is also the most misunderstood aspect of digital cameras. A pixel is like a single tile on a mosaic, only that the tiles are so small compared to a mosaic that the resulting image appears very sharp.

In cameras, a pixel is used to denote a single tile on the image sensor that receives the image. A CCD or CMOS sensor in the camera has an array of these tiles that receive the light and convert it into electrical signals that are processed to give the picture. One such array of 2048x1536 will give a pixel count of 31,45,728 pixels, that is, 3.1 megapixels (MP).

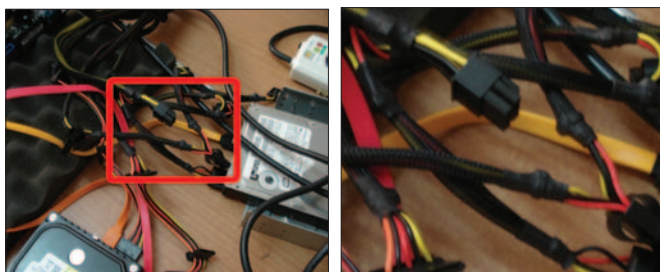
However, the number of megapixels in a camera is a very mean measure of the quality of the images that it produces. A higher MP count does not necessarily signify a better image quality, but both the consumer and manufacturers are caught up in a megapixel race. The quality of the lens, algorithms used to make the photo from raw data collected by the sensor, and the focusing mechanism are some of the more important factors contributing to the quality and sharpness of the image – factors where improvements in the image will be much more apparent than cramming in ever more pixels.

For all practical purposes, 3 MP is adequate, while 6 MP is ample – anything higher is moving towards generosity. Another important factor to consider here is how large the sensor itself is. Consumer digital cameras have tiny image sensors – measured in microns, which is a millionth of a metre. Most sensors are less than 10 microns across. This is largely due to the size of the cameras, which are designed at least to fit in your pocket.

Similarly, larger dSLR cameras have much larger sensors, sometimes the size of a conventional frame in a roll of film. Smaller sensors are also cheaper to manufacture. The size of the sensor itself is often overlooked while making decisions of which camera to buy, but it plays a decisive role in the quality of the image.

Generally, a smaller sensor produces images that have more noise than those produced by a larger sensor. A smaller sensor comes with its own set of problems such as difficulty in focussing on smaller areas. Further, shaking is exaggerated and despite a high density of cells on the sensor, the image quality is rather low. Try to get as large a sensor as possible.

Be careful not to drool after that 50 MP camera that everyone dreams of. In the right hands, a 6-MP camera can take much better photographs. For publishing purposes, an 8-MP image is normally used. So that's the real deal with megapixels. Now that the biggest myth in digital photography is hopefully busted, there are a few real-world scenarios where that large MP count actually comes into use.



A comparison of detail in a 3.0 MP camera

Many photos, taken off hand, reveal startling details in the background that the photographer might not have noticed while shooting – like a passer-by with a crazy expression behind a group photograph. A high MP count is also useful for shooting far away objects such as aeroplanes, or birds using cameras with a limited optical zoom. This is effectively a digital zoom, but a higher MP count ensures that the resulting image is not terribly grainy – a defect typical to digital zoom.

## 1.2 Image parameters

Basic image parameters are hue, saturation, contrast, sharpness, tone and colour space. Many digital cameras have settings that play around with these image parameters. These include vividity or beach settings that intensify the colour blue, but you are not given much control over these settings

in any of these cameras. A few dSLR cameras allow you to play around with these parameters; but again, these are not uniformly available.

The Nikon D300 and the Nikon D400 allow tweaking image parameters, both by settings for individual parameters and presets. The Konika Minolta A2 has bracketing options for image parameters, which allows you to take the same image using different image parameters. The Canon EOS 30D allows a range of tone and saturation options. The differences in settings in these cameras are very subtle. Many Nikon cameras like the Coolpix P50, and many Canon cameras such as the PowerShot SD850 IS have options for lighter and darker skin tones.

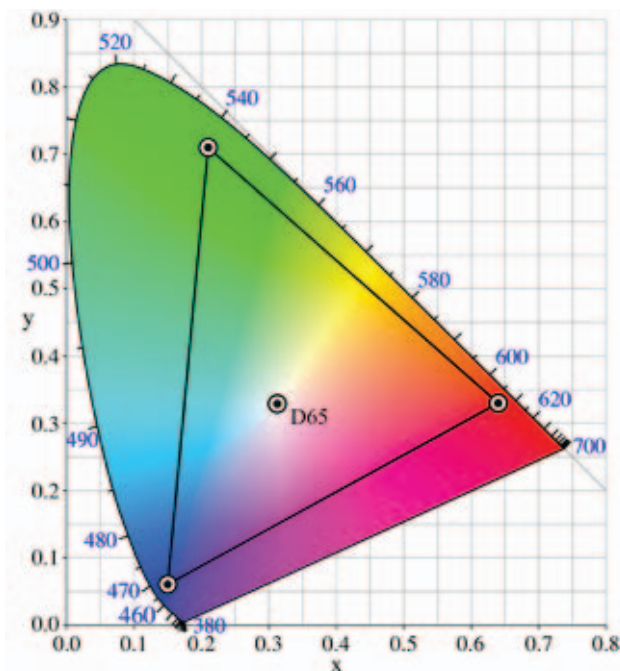
The ideal approach is to shoot in the RAW file option when available, and later tweak the image using image editing software. The most commonly used image parameters are sepia and black and white. While this can make photos very effective, it is often overused and it is better to take the original image in colour and change it according to requirements later on, instead of shooting the image with a colour loss in the first place. Many digital cameras have unique options with regard to image parameters. This portion will focus on what these parameters are specifically, and how they can be used to improve photographs digitally.

### Colour Space:

A colour space is a model used by computers to map colours using numbers. Different computational methods use different colour spaces. There are two basic types of colour spaces — additive colour spaces like RGB and subtractive colour spaces like CMYK. Additive colour spaces are used on displays and screens, with a different combination of primary colours giving the appearance of a particular colour.

Subtractive colour spaces are used more in print applications, where the colour has to be subtracted from the white substrate so that the reflected light can be perceived to be of a particular colour. Basically, in an additive colour space, the screen emits the light of a particular colour using a combination of primary colours. On the other hand, in a subtractive colour space, the surface absorbs all wavelengths except the colour that needs to be perceived.

Adobe's RGB colour space is commonly used in many dSLR cameras, although some have propriety colour spaces. Before printing your own photos, it is always a good idea to convert the image into a CMYK colour space to get an accurate idea of how the photo would appear when printed. This reduces the disparity between the perceived colour of the photo on screen and when printed.



The Adobe RGB Colour space

Even if you do not change the colour space manually, the computer does so before printing. To change the colour space of an image in Photoshop, go to **Image > Mode** and select a colour space. An understanding of a colour space is required to understand how other image parameters such as hue, saturation and brightness work. RGB colour spaces are defined within computers using these image parameters as axes or defining guides for the colours. Colour spaces based on the

RGB model include HSL (Hue, Saturation, Lightness) and HSV (Hue, Saturation, Value).

### Saturation:

This is basically the intensity of a particular colour. An image with zero colour saturation is a grey-scale image. Some digital cameras have a vivid or high contrast setting to increase the saturation of all the colours in an image. Far greater control can be achieved in Photoshop or other image editing software. Some image organisers and viewers also allow this option.

In still images, and those depicting flowers or fruits, increasing the saturation of the photograph can bring the photo to life, and bring out the natural coloration in the subject better. Experiment with digitally reducing the saturation of an image as well, this gives a subtle rustic effect to the photograph, particularly good when photographing vehicles such as trucks, cars or trains. Reducing the saturation and then increasing the contrast gives a grunge feel to the photograph, and can be used effectively for portraits and photographs of pets.

Filters are attachments to lenses that increase the saturation of a particular colour. Commonly available filters used in SLR and dSLR lenses are green, red and blue. Some digital cameras such as the Nikon Coolpix P50 and the Canon PowerShot SD850 IS offer saturation controls for these colours as well as a custom colour option.

### Hue:

Some dSLR cameras from Canon, Nikon, Pentax and Konica have a hue option for clicking photographs, which shifts all the colours by a certain degree. You can also achieve this using an image editing software.

Shown here are four different variations of a hibiscus.



This effect can be used to produce abstract or surreal photographs, depending on the tone of the event, for better impact.

**Contrast:**

Contrast is basically an increased vividness of a colour in terms of its brightness. A high contrast is used in an image to make an object stand out against a background, or to bring to focus a wide array of colourful subjects such as in a busy marketplace or a still life photo. The greater the contrast in an image, the better is the detail brought out.

**Sharpness:**

Also called acutance in photography terms, sharpness refers to how detailed the edges in an image are. A greater sharpness results in a grainier image, while a reduced sharpness yields a washed out appearance. Most DSLR cameras have an option to fine tune the sharpness of an image, and so do many digital cameras. Sharp images are visually appealing mostly in close-ups, or with images having a high amount of detail. A high sharpness in portraits or landscapes can make the photos look unnatural.

**Tone:**

The tone of an image sets the mood of the picture. A warm tone tends to be redder with prominently orange, red and yellow colours. A warm tone is also more masculine. On the other hand, a cold or cool tone tends to be bluer with soft, mellow colours and is more feminine. Some DSLRs come with a tone setting, with positive or negative steps towards blue or red. A small increment in the saturation of red or blue is enough to set the tone for an entire image.

**Black and white:**

Black and white or greyscale images are a standard feature in most digital cameras and DSLRs. Black-and-white photographs have a definite charm to them, but this effect is often over-used and abused. Greyscale images tend to produce a wide range of emotional responses in an individual, from a feeling of desolation to nostalgia.

It is always a good idea to take a colour photograph and

then turn it into greyscale on a computer. Portraits and landscapes are two common and effective subjects for greyscale images. Increase the contrast to bring out the detailing in greyscale images. Compare if the image looks better in greyscale than it does in colour.

### **Sepia:**

The sepia tone in old photographs is the result of a chemical used in the printing process of black-and-white photographs that allowed the photos to last longer. Modern digital cameras and DSLRs have this as an added feature. Again, this is another abused feature. While taking a photo in the Sepia mode might seem fancy, it is considered terribly amateurish and is hardly ever used effectively.

## **1.3 Shooting modes**

Shooting modes are used in digital cameras to compensate for the aperture, shutter speed and exposure settings available in analogue SLR cameras. Some shooting modes like red-eye reduction and the text mode use algorithms to work on the RAW data and create a better image. There are versatile shooting modes available across the range of consumer digital cameras, and working with them can often be confusing. Most users simply use “auto”, or have a highly functional approach to shooting modes – using the portrait mode for shooting portraits or the macro mode for shooting close-ups. Understanding how these modes work will allow users to experiment and better adapt the modes for their purposes.

### **Action/Sport:**

In most cameras, the icon for the Action or the Sport/s mode is a sprinter. In this mode, the camera uses a very high shutter speed, and typically, a small aperture. This means that the sensor in the camera is exposed to light for a very short amount of time, in some cameras, for the shortest amount of time allowed by the mechanism. This reduces the blur of fast moving objects. It is essential that this mode is used only in ample light conditions, as the sensor receives very little light. Some cameras compensate for this by artificially boosting the

brightness of the image, or by setting a high ISO. However, both these methods end up churning out noisy images. This does not mean that good action or sport photos can be taken only in this mode. Choosing a wider aperture, and a mid-range shutter speed, and then tracking a moving object with the camera can often provide good results with the subject in focus and the background blurred in movement.

### **Aperture priority/preferred (Av):**

The aperture priority mode, is used to manually set a depth of field in your camera, while the camera automatically does the rest. The depth of field decides which aspect of the frame is in focus. A large depth of field means that everything in the frame will be in focus, from subjects close to the camera to details in the background. This setting is used for landscape photos. A small depth of field means that, say, a subject close to the camera will be in sharp focus, whereas the background will be out of focus.

There is a whole range of depth of field settings between these two settings that a user may experiment with. The aperture is measured in f-stops, and a large f-stop number reduces the amount of light that comes in, but creates a large depth of field. Using a large f-stop number also means that there will be a fast shutter speed and a large ISO setting, which might bring noise into the story. A small f-stop number increases the amount of light that comes in and produces a small depth of field; also, the shutter speed is reduced, so the camera has to be held steady while using this setting. As the shutter speed is reduced, this setting also uses a proportionally smaller ISO setting. The camera automatically adjusts the white balance as well.

### **Aquarium:**

The aquarium mode uses a fast shutter speed at high ISO settings to capture moving fish in low-light conditions. The reflection of the flash from the glass of the tank is automatically suppressed, and the white balance is set to tone down the blues to bring out the natural colours in the aquarium. This mode is available in a few Canon cameras.

**Autumn:**

The autumn mode sets a warm tone for the image, increasing the saturation of the reds and yellows, and as a result, related colours like brown and orange. You can automatically set all other settings such as the aperture, exposure and shutter speed.

**Baby:**

A small aperture and high shutter speed is used for this setting to capture kids in action. White balance is set to capture softer hues.

**Beach:**

The beach mode is used differently in different cameras. Some cameras increase the saturation of warm colours to bring out the sand and the sun better. Some cameras increase the saturation of blue to highlight the sea.

In sunny conditions, the face is often in shadow because of a cap or because the sun is so bright in the background. Some cameras use a flash or artificial brightening algorithms to make sure that people in the photograph are not silhouetted by the sunlight.

**Colour Accent:**

This feature lets you pick a particular colour, and then retains only that colour in any image you click, by converting all other colours to a monochrome black-and-white photograph. This means that against a greyscale image, an object of a single colour will stand out.

**Colour Swap:**

This feature lets you select a particular colour, and then change it to another colour that you select, while not shifting the hue of any other colour in the photograph.

**Easy:**

The easy mode lets the camera do all the work — all you need to do is click in peace. This mode is to allow kids use the camera. Some cameras increase the size of the menu in this mode for easier navigation.

**Fireworks:**

This mode uses the slowest shutter speed possible, so that the entire explosion of a firecracker is captured on the image. This also means that the aperture will be very small, with consequently a smaller depth of field. Images taken in this mode are bound to be a little blurred, but that is the idea when photographing firecrackers.

**Flower:**

The flower mode increases the depth of field by using a small aperture to bring to focus subjects close to the lens. This mode also increases the saturation of the colours in the photo, to produce a bright and vivid image of flowers.

**Foliage:**

Not to be confused with the macro mode, the foliage mode increases the saturation of green or naturally occurring bright colours to provide clear and vivid images of flowers or leaves.

**Indoor:**

This mode is for low-light conditions indoors, with changes made to the white balance to optimise indoor conditions, and capture the natural ambience of soft lighting conditions. A high ISO is typically used in this mode.

**Kids and Pets:**

Similar to the action or sports mode, this setting uses a small aperture and a fast shutter speed. This allows for clear images of small kids and pets in action. Do not use this mode to capture stationary kids and pets.

**Landscape:**

The landscape mode narrows the aperture (a large f-stop value) to increase the depth of field as far as possible. This allows objects in the distance to be in sharp focus, as well as anything close to the camera. A fast shutter speed and a high ISO are used in this setting, and should be used to capture anything from cityscapes to photos from a height.

**Light Effect:**

This mode adds different effects to sources of light, or points of light in an image. The mode can be used to capture glamorous shots with a sparkle effect, or ghost-like shots with an orb effect. A number of light effects are available on different cameras for this mode.

**Macro:**

The macro mode enables the capture of objects very close to the lens. This is usually achieved by allowing the lens to move further than normal away from the sensor. This decreases the depth of field, and so the aperture is usually narrowed (higher f-stop value) to compensate for this.

A slow shutter speed, and a low ISO is typically used, which means that the camera will have to be fairly stable to take an image without blurring. Use this mode to capture close-ups. The macro mode is a standard feature in most digital cameras and is typically indicated by a flower icon.

**Manual:**

This mode lets you set the aperture, shutter speed, white balance, and other settings such as saturation, where available. It also gives you absolute control on all aspects of the image, but is a rare feature in digital cameras.

**Museum:**

The museum mode turns the flash off, and in some cameras, turns off all the sounds that the camera makes as well. Consequently, a larger aperture, a high ISO and a fast shutter speed is used to capture the images in this mode. To be used in museums or libraries with minimum disturbance to the other people around.

**Natural Light:**

Typically used indoors, this mode suppresses the flash, uses a high ISO and a fast shutter speed to capture an image in natural light conditions. This means that the camera will have to be fairly stable in this mode. Use it to capture soft indoor portraits of people or pets.

**Night:**

A slow shutter and a small aperture are used to capture photos of buildings or other lighted facades at night. Do not use this mode to capture photos of people at night, for which the night portrait mode is used. This mode does not use flash, and the camera will have to be stable to produce a clear, crisp image. In fact, we recommend you to use a tripod to avoid blurred images. Use this mode to produce abstract images or trails by moving the camera around with the shutter open. Some cameras employ algorithms that reduce blurring in this mode.

**Night Landscape:**

A large aperture, high ISO and a slow shutter speed makes this combination notorious for producing shakes. This mode is used for capturing landscapes at night, without the use of flash. This means that the camera will have to be very stable.

**Night Portrait:**

This is a tricky mode to operate in. Flash is used to illuminate the subject in the foreground, while a slow shutter speed is used to bring out background details. The camera will have to be very stable to prevent shakes. A small depth of field is used, so the background will be out of focus. Be careful not to stand too close to the subject, as this will overexpose their face with the flash.

**Party:**

The party mode uses a high ISO, with a large aperture and a fast shutter speed to capture images in low light conditions. Flash may or may not be used in this mode. Some cameras also use image stabilization and blur reduction, but the low light conditions are not conducive to clear and crisp images.

**Picture stabilization:**

A fast shutter speed is used to reduce blurring. Should be used inside a moving vehicle, or on any kind of moving platform. Algorithms for reducing the effect of camera shakes are applied in this mode.

**Portrait:**

A standard feature in most digital cameras, the portrait mode uses a larger aperture size than the macro mode, but smaller than the landscape mode. This means that when you focus on subjects in the foreground, but not too close to the camera, the background will be out of focus. This draws the eye to the subject in the foreground of the final photo as the background is out of focus. A small aperture and a small depth of field are used.

**Program AE:**

The program AE or program mode automatically sets the shutter speed and the aperture in the camera, letting the user play around with other features such as the white balance and whether or not to use the flash.

**Red-eye reduction:**

This mode uses an algorithm that reduces the red eyes in photos. The camera settings are similar to the settings used in portrait mode.

**Shutter priority/preferred (Tv):**

The shutter priority mode allows a user to set the shutter speed of the camera, and the camera sets the other settings automatically. The shutter speed lets the user decide how sharp or blurred the image should be.

**Snow:**

The snow mode is used to set the white balance in such a way that a white background does not make people or objects in the foreground appear dark. Also the overwhelming white background is toned down, to capture subtler hues of blue or green. This is similar to the beach mode in terms of not letting a subject appear dark.

**Stitch/Panorama:**

The stitch or panorama mode in cameras typically allows three photos to provide a wide angle image. A section of the image appears to one side of the screen to allow users to overlay the next shot.

**Sunset:**

The sunset mode changes the white balance to capture the deeper and subtler hues that appear during a sunset. This mode also reduces the glare of shooting the sun directly in some cameras. A warm tone is applied to the image.

**Text/Document:**

The text or document mode in cameras optimises the white balance by whitening the white areas, while darkening the black areas. The image is also made crisper and sharper, which makes this mode ideal for shooting all forms of written text, like a ticker, a road sign, graffiti or documents.

**Theatre:**

The theatre mode suppresses the flash, uses a large aperture and a slow shutter speed to capture images inside an auditorium where flash is not allowed. Some cameras also increase the vividity, and the brightness or ISO settings artificially.

**Underwater:**

The underwater mode, where available, suppresses flash, uses high ISO speeds and desaturates the blue coloration to give a natural photo underwater.

**Video:**

The video mode allows capture of motion on camera. The duration of the video may vary from 5 seconds to 10 minutes and larger depending on the memory and the camera. There are also a few image size settings available in most cameras. The camera settings for the video are handled automatically with little or no control available to the users.

## 1.4 White Balance

Whether it is fluorescent lighting, or low-light conditions during sunset, humans can differentiate between colours without any effort. This, however, is not the case with a camera. The sensor in the camera just records the image with respect to the amount of light falling on it. The reflected light from an object is affected by the colour temperature of the light source.

Tubelights and CFC bulbs, for example, have a high colour temperature, with the light being a little blue. Candlelight or a tungsten bulb or a street lamp have a slightly lower temperature and tend to reflect with a tint of orange. Outdoors on a bright sunny day have a very high temperature, also with an orangish light. The tint of the lighting conditions under which the photo was taken influences the photo, if the correct white balance is not used. The most common mistake because of this are photos like these, which are taken indoors under fluorescent lighting without using the correct white balance.



Incorrect white balance (left) Correct white balance (right)

The white balance setting shifts all the colours in the image sensor according to the source light colour temperature. A proper white balance essentially ensures that the colour white shows up as being white in the photograph. Any photo with some white element in it allows the camera to accurately and automatically set a white balance for the picture. Using white balance on auto all the time does not really work. Most digital cameras have white balance settings based on available illumination. These include cloudy skies, tungsten light, fluorescent light, daylight and flash. Some cameras may use a term known as “Kelvin” to adjust the white balance. Here is a rough idea of the temperature of commonly encountered light sources.

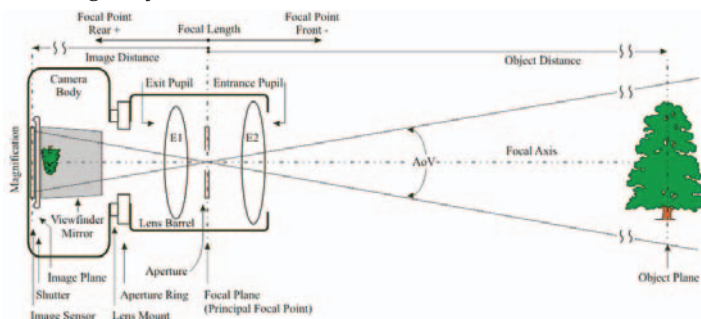
0 W bulbs, candles	–	1000 Kelvin
Tungsten bulb/sunrise/sunset	–	3500 Kelvin
Tube lights/fluorescent lights	–	4500 Kelvin
Flash	–	5000 Kelvin
Sunlight	–	6500 Kelvin
Cloudy sky	–	8000 Kelvin

Kelvin refers to the temperature — in degrees Kelvin — of the black body radiation that is equivalent to the light source.

These are approximate values, but should give you some idea of the colour temperatures of different light sources. Use a visiting card (or any other white object) in front of your camera before you take a photograph so that the camera can adjust the white balance according to the needs of the image.

# Shooting Settings

Now that you've understood what digital images are made of, look before you shoot — you just might shoot yourself in the foot. Before you set out on a shutter-bugging expedition, allow us to tell you a wee bit about the settings in your camera.



Here's a cross section of your camera for quick reference

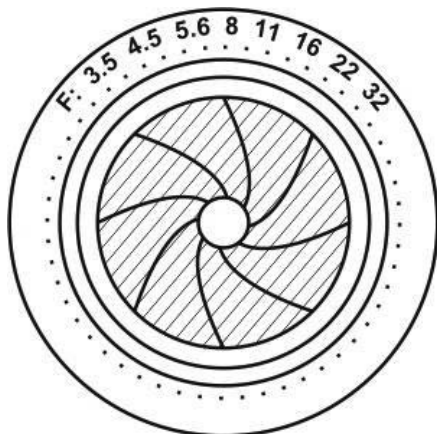
## 2.1 Aperture priority mode

Almost all cameras these days come with preset modes. These modes are preprogrammed settings in the camera and all you have to do is rotate the dial and the camera automatically adjusts the shutter speed, exposure, etc. saving you a whole lot of manual adjustments. Some of the basic preset modes are Action, Landscape, Macro, Portrait and Night while some of the advanced ones are the Aperture Priority Mode, Shutter Priority Mode and Manual mode.

### Aperture: Basics

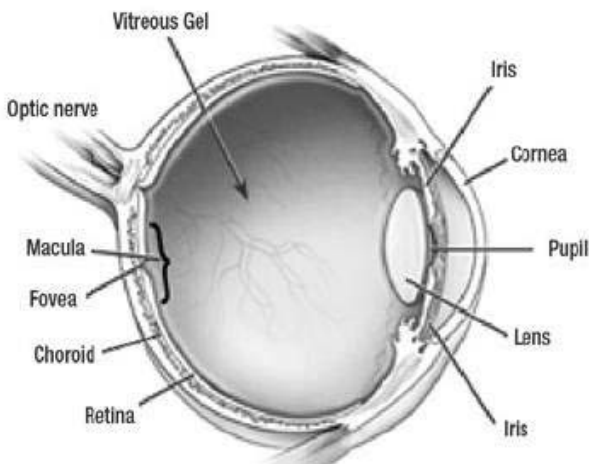
An aperture literally means an opening or a gap. When it comes to cameras, it's the opening or the diameter of the opening through which light passes behind the lens and then on to the camera sensor. Without an aperture, the sensors (or

the film – as used to be the case) inside your camera would not receive an input at all.



The aperture is the (w)hole thing

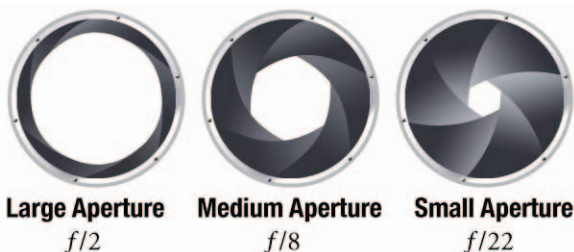
It all becomes much easier to understand if you just compare it with the mechanism of the human eye. The aperture is nothing but a mechanical iris. The iris of your eye has mus-



The camera is like another eye

cles that adjust the size of the pupil to regulate the amount of light entering the eye. When your eye dilates, more light is allowed through the lens. Similarly, when the aperture of a camera opens up wide, more light is permitted from the lens to the sensor.

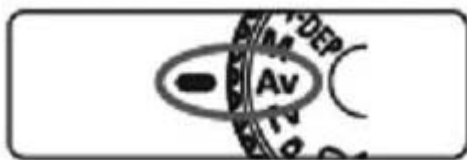
On the other hand, when the aperture shrinks, less light is allowed in.



Open means more light. Closed means less

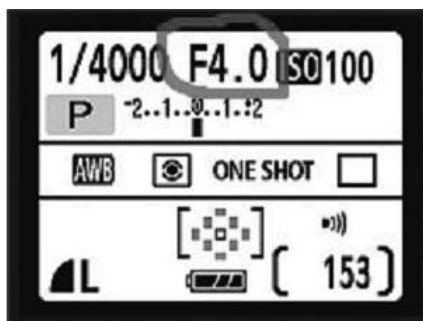
### Av Mode

Aperture priority mode – also known as ‘Av Mode’, where ‘Av’ stands for ‘Aperture Value’ – allows you to decide how big you want the aperture to be. Instead of the camera doing the thinking and changing the settings automatically, you can manually adjust the aperture to suit the subject matter. The camera then automatically adjusts the shutter speed and other exposure settings according to the lens aperture you have set. This ensures the correct exposure. Aperture priority is marked on camera dials by the letters ‘AV’ or ‘A’.



Dial ‘Av’ for Aperture Priority

The aperture value is displayed on the LCD screen of your digital camera, given as an ‘F’ number.



F equals 'Av'

This is different from Manual mode (in which you must choose both the shutter speed and the aperture value, the Shutter Priority mode (in which you pick only the shutter speed and the camera adjusts the rest) and the Program mode (in which the camera chooses both). If you want an audio-video, step by step set of instructions, just visit <http://www.5min.com/Video/How-to-use-the-AV-Mode-on-Your-dSLR-72416815>.

### Av Mode and the Depth of Field

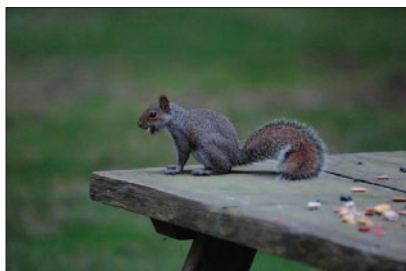
The most significant benefit to using A-mode is that it gives you a higher degree of control over what's known as the *Depth of Field*. What's that? We'll tell you.



The 'Big Picture' needs deeper focus

The *Digital Photography Manual* by Winn L. Rosch defines depth of field as *the range of distances that appears to be sharp or in focus in a photograph*. Greater depth of field means most of the scene in the frame has a high degree of sharpness. Both, the foreground as well as the background are in sharp focus.

A shallow depth of field allows a certain subject or selection (within the depth of field) to be in sharp focus while the rest of the scene appears less sharp or blurred.



The Av mode, therefore, gives a higher degree of control over the depth of focus of your photograph. You can set the aperture as required, depending on whether you're focusing on a particular object or person or trying to capture a natural scene. If set to a small aperture, a wide-angle lens, for example, would give you a nearly infinite depth of field. This is indispensable when it comes to photographing landscapes. A wide aperture, on the other hand, coupled with a longer lens, allows you to bring a particular object in the foreground into sharp focus. This setting would be ideal for portrait photography.

The aperture priority mode tells the camera how it should choose the shutter speed, minimising the risk of poor exposure or overexposure. Typically, while using Av mode, you should keep in mind that landscapes would need smaller apertures and portraits, larger ones.

The expert control of the aperture value is what transforms photography into an art. And to become that expert, you'll need to understand the *f* that you see on the LCD screen.

The expert control of the aperture value is what transforms photography into an art. And to become that expert, you'll need to understand the *f* that you see on the LCD screen.

## 2.2 Aperture Size (f-number)

Lens apertures are usually measured as f-stops, denoted by f-numbers. You'll find it referred to in books and maga-



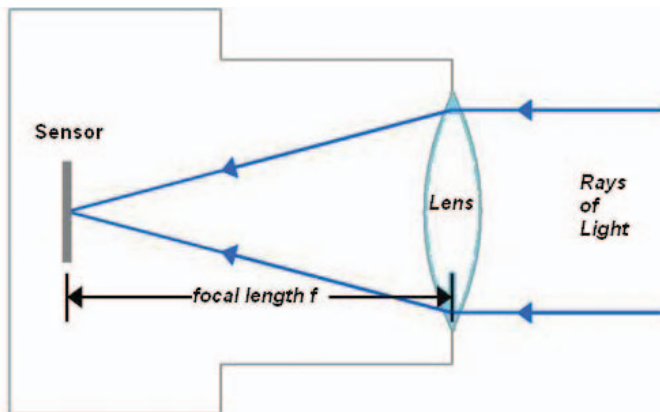
The 'leaf-shutter' kind of diaphragm is made of a number of thin overlapping blades

zines by the character 'f' followed by a number such as  $f/1.4$ ,  $f/2$ ,  $f/2.8$  and so on. These are basically gradations that let you adjust the quantity of light or exposure for a particular shot. As you vary the f-stop values, you may notice an apparatus called the 'diaphragm' constricting or expanding behind the lens to permit a correspon-

ding quantity of light.

Technically, an f-stop number is the focal length of the lens divided by the diameter of the aperture. Simply put, the f-number is the ratio of the size of the aperture that the light passes through, to the focal point of the lens.

Each f-number represents a halving of the light intensity from the previous stop and a decrease of the aperture diameter by a factor of  $\sqrt{2}$  (around 1.414). Therefore,  $f/11$  is half as much as  $f/8$ , and  $f/5.6$  is twice as much light as  $f/8$ . Currently, most lenses use a standardised f-stop scale – which is a geometric sequence of numbers that correspond to the sequence of the powers of  $\sqrt{2}$  – viz.  $f/1$ ,  $f/1.4$ ,  $f/2$ ,  $f/2.8$ ,  $f/4$ ,  $f/5.6$ ,  $f/8$ ,  $f/11$ ,



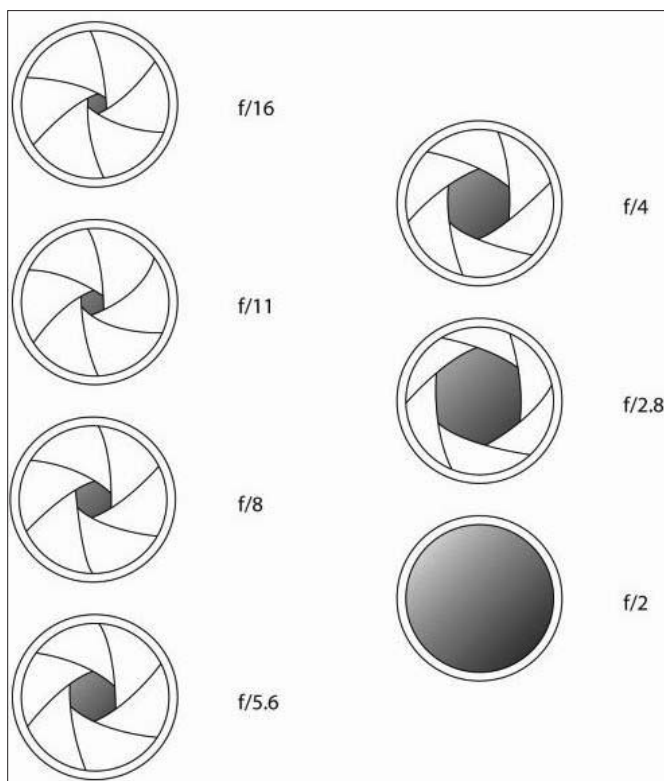
High school physics now makes sense

and so on, with some of the numbers rounded off for convenience. You'll notice that the slash indicates division. For example,  $f/16$  means that the aperture is equal to the focal length divided by sixteen; that is, if the camera has an 80-mm lens, the light that reaches the film arrives through an opening that is 5 mm ( $80 \text{ mm}/16$ ) in diameter. Given below is a table of aperture stops of a typical 50-mm lens.

f/stop	Diameter of aperture (mm)	Radius of aperture (mm)	Area of Aperture (sq. mm)
f/1.0	50.0	25.0	1,963
f/1.4	35.7	17.9	1,002
f/2.0	25.0	12.5	491
f/2.8	17.9	8.9	250
f/4	12.5	6.3	123
f/5.6	8.9	4.5	63
f/8	6.3	3.1	31
f/11	4.5	2.3	16
f/16	3.1	1.6	8
f/22	2.3	1.1	4
(As shown on screen/ lens)	(50 mm divided by f/stop)	(1/2 the diameter)	(pi X the radius squared)

As the f-number increases, the diameter of the aperture decreases, letting in half the amount of light as the previous one. Effectively, if you want to *open up* in photography jargon, then you'll be reducing the f-number. Similarly, *stopping down* in shutterbug lingo would mean you're constricting the opening by increasing the f-number (and thereby acquiring a sharper overall image).

Lenses are usually described by their maximum possible aperture (represented by the smallest f-stop number). When in Aperture Priority mode, a high f-number refers to a slower shutter speed. A low f-number like  $f/1.4$  will automatically speed up the shutter speed when in Aperture Priority Mode to avoid over-exposure.



To expose or not to expose...

### **f-number and Sharpness**

Typically, you would like to stick to the middle range of f-stops and the sharpest image is usually obtained in the range of about  $f/5.6$  to  $f/8$ . High f-numbers sometimes spoil the shot due to diffraction (the softening of the image which makes it lose its sharpness), vignetting (dimming/darkening on the edges of the picture) or aberration (degraded sharpness, lowered contrast, distorted shape).

### **f-number and Depth of Field**

The greater the f-number, the greater the depth of field. So you'll need a higher f-number for landscapes and lower one to

sharpen the focus on to individual subjects. Depth of field decreases with lower f-numbers.

Aperture width and shutter speed are inextricably linked. Here we take a look at the importance of shutter speed.

## 2.3 Shutter Speed

In a digital camera, the shutter serves to adjust the time during which the image sensor collects the light that it receives through the lens. Thus, along with determining the level of brightness of the image, the shutter manages to capture the image at a particular moment during which movement is negligible – almost freezing the action to catch a slice of space and time. A *shutter* usually stays shut (to keep the back of the camera – the image sensor – dark and unexposed) till you click, which is when it opens for a fraction of a second (anything from 4 to 1/4000th of a second) and then shuts again.

If you thought that the shutter is called a *shutter* because it shuts a lot, allow us to clarify that the name comes from the fact that it *shuts out* the unnecessary light. A shutter lets in the amount of light required for your shot and also protects the image sensors because they could get damaged if overexposed.

A common misconception is that digital cameras don't have mechanical shutters at all. A digital camera could have a mechanical or electronic shutter – some cameras use both – but don't strain your eyes trying to spot them because some digital cameras (especially the ultra-portable types) don't have a shutter at all.

### Mechanical Shutters:

A mechanical shutter uses a real (opaque) obstruction controlled by an electronic timer. There are different kinds of mechanical shutters:

a) Between-the-lens shutters: These are fitted inside the lens itself, usually near the aperture iris. Typically, this is made of several blades that slide over one another to open or shut the aperture. The greater the number of blades, the more circular is the aperture.

b) Focal-plane shutters: These shutters lie really close to

the image sensor, near the focal plane of the lens. The focal plane shutter is made of two opaque *curtains* placed over the sensor slightly apart.

### Electronic Shutters:

Electronic shutters precisely control the time for a particular exposure according to the duration set. In the case of electronic shutters, the data that the image sensor has stored up for a particular image is wiped clean and the sensor then becomes like a new panel in a photographic film – fresh and ready to collect light again using the electronic shutter.

### Shutter Speeds

The time duration that a shutter stays open is called *Shutter Speed* – a.k.a. *Exposure Time*. The better the camera, the wider range of shutter speeds it offers. Shutter speeds are measured in fractions of a second and while manufacturers earlier fixed their speed settings randomly, standardisation has made it a lot easier now.

The standard settings for shutter speeds are

- 1/1000 s
- 1/500 s
- 1/250 s
- 1/125 s
- 1/60 s
- 1/30 s
- 1/15 s
- 1/8 s
- 1/4 s
- 1/2 s
- 1 s

In low-light situations, you'll need a wider aperture and a longer exposure time – read a slower shutter speed. Very short shutter speeds are great for 'stop-action' pictures where you'd like to freeze fast-moving subjects, as in sports photography. But for normal shoots, the camera movement can blur photos if the shutter speed is too slow, making the image seem out of focus. It's virtually impossible to hold the camera absolutely still for long, so unless you have a tripod, a shutter speed of 1/500 with an aperture stop of  $f/8$  would give you a pretty neat

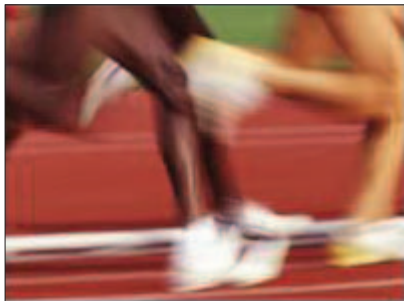
picture on a bright day. The following aperture values, coupled with these shutter speed settings would give you the same exposure.

- $f/2.8, 1/4000$
- $f/4, 1/2000$
- $f/5.6, 1/1000$
- $f/8, 1/500$
- $f/11, 1/250$
- $f/16, 1/125$
- $f/22, 1/60$

As the same amount of light would strike the image sensor, all the above settings would give you an equivalent exposure.

### Shutter Lag

Pick up your old (non-digital) camera and click and you'll notice that there's a bit of a break between the instant that you press the button and the opening of the shutter for the particular exposure. The reason for this shutter lag is mechanical. With digital cameras, there's a delay too, but this time it's more of a *processor lag*. The reason is that the camera needs time to set up the circuits and do the calculation for image capture. Sensors need to take measurements, distances need to be calculated and light, colour and whiteness must be balanced. All this, and it just takes a second and a half! And then, it takes the image data and even remembers it for you.



Lag ruined this one

The best method to deal with shutter lag problems in auto-focus shots is to: (a) point the viewfinder directly on to your subject; (b) push the shutter release down – but only halfway – because this permits the camera to focus even before you take your photo; (c) keep the shutter release button halfway down till you feel it's the right moment to catch the image

and then press it all the way down. Most shutter-lag snags will disappear with just this little bit of care.

## 2.4 Shutter Priority Mode

Much to the relief of the photography-illiterate, almost all digital cameras set their shutter speeds automatically. The camera senses the level of light in the environment and even controls the lens aperture. But this is in *program mode* or when your camera is on auto-pilot. If you know exactly what settings you want, you can override the camera's settings and fix the shutter at the stop you need manually using the *Shutter Priority Mode*.

The Shutter Priority Mode (or Shutter Mode) is the reverse of Aperture Priority Mode (or Aperture Mode). Shutter priority mode is also called *Time Value Mode* on some cameras and you could find it on the dial represented by the letters 'Tv' or just 'S'. For those cameras without a dial, you'll need to press 'Menu' to access the available modes. This basically allows you to choose the shutter speed yourself. Accordingly, the camera sets the aperture value to the corresponding f-number.

Shutter mode is the best choice for action photos and for particular photographic effects. Fast exposures are excellent for stop action and slow exposures serve to blur moving subjects. Particularly exciting is *burst mode* – when the



Dial 'S' for shutter speed

camera takes a series of photos in rapid succession, letting you choose the one that caught the crucial moment later.

You could alternate shutter speed and aperture by using 'stops'. A fast shutter speed would need a larger aperture (and so, a smaller f-number). On the other hand, a slow shutter speed would need a smaller aperture. Raising the aperture value while simultaneously lowering the shutter stop value would give you the same exposure because a stop up and

down on each will halve or double the amount of light regulated by each.

### Shutter Speed and Sharpness

Shutter speeds are not entirely responsible and aperture values also play an important role in ensuring sharpness in an image. Typically, wide apertures (with small f-number like f-2.8) result in faster shutter speeds which is good for stopping action.

### Shutter Speed and Depth of Field

If your subject needs depth of field (everything in the image in sharp focus), then you will need a small aperture (bigger f-number) and consequently, a slower shutter speed. Slow shutter speeds lead to longer exposure, and therefore, are



‘Moving’ pictures with slow shutter speeds

excellent for blurred images which help to bring a feeling of movement in the static photograph.

### Reciprocity

Reciprocity is nothing but the relationship between the shutter speed and the aperture. A small aperture with a long shutter speed, for example, is equivalent to a large aperture with a short shutter speed. There’s no universal solution or optimal configuration to this relationship and you’d have to alter them yourself depending on the subject, lighting and treatment you’d like to give to the photograph. Or else, it’s back to ‘Auto’ mode again for you.

Okay, so f-numbers increase, aperture values decrease, shutter speeds increase and so exposure time decreases. Did that make it simpler or more confusing? Actually, the whole

shutter-speed thing becomes much easier thanks to ISO ratings, so let's shift focus a little and tell you all about the ISO.

## 2.5 ISO Rating

Heard about it before? Then you probably already know that it stands for the International Organisation for Standardisation. And you can find all its efforts to make standardise units – as well as the standards for photography – at [www.iso.ch](http://www.iso.ch).

### ISO and film

Anybody who's bought a roll of photographic film with some judgment would have an idea of what 'ISO' refers to. All films are assigned an ISO value – a number which signifies the film's reactivity to light. So even though people often call it the 'speed rating' of a film, it's got nothing to do with speed at all and actually only refers to its Ev (Exposure value) – the combination of aperture value and shutter speeds required for the optimal use of the film.

Typically, for the consumer, a *slow* film (with a low ISO rating) was supposed to give you better quality images and a *fast* film (with a high ISO rating) was for poor lighting conditions and poorer quality. In reality, it was all about the size of the granules in the chemicals used on the film.

### ISO and digital cameras

Films don't figure at all in digicams. So why do they still have an ISO rating anyway? Let's just say that photographers all over the world have, over the years, been accustomed to using the ISO rating to instantly understand how it would work in different lighting. Digital cameras with an ISO rating of the *faster* film mimic its reactivity by amplification of the signal that the sensor receives.

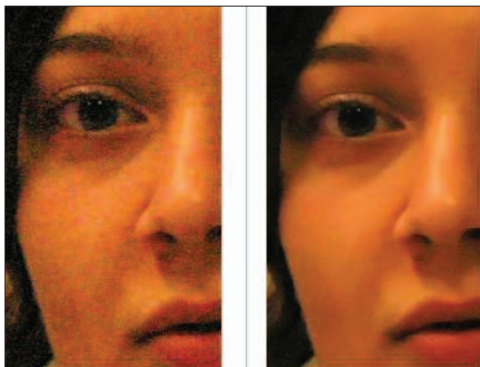
The ISO control, sometimes labeled as sensitivity – might be located at different places in different cameras. It could be labelled on the camera's body or accessed through the 'Menu' command. You can now adjust the ISO rating – almost like changing the kind of film you're using. Raising the ISO rating increases shutter speeds and smaller apertures and lowers the

ISO number. This means slower shutters and larger openings. The point that most of us miss, however, is that there is just one sensor in the digital camera that cannot be replaced as easily as a roll of film. At any given point in time, the number of pixels stays the same. Changing the ISO, therefore, has no impact on the detailing of the image. But, strangely, increasing the ISO speed, similar to film cameras, the quality of the image dwindles due to noise.

## Noise

Visual noise is unwanted interference that hinders the accurate perception of the image. In digital images, *noise* appears as *graininess* – specks of phoney colour. The longer the exposure, the more noise, but for normal photography, a sensor manages to produce a bearable and consistent degree of noise. Noise levels vary according to (a) the size of the sensors and its pixels, (b) the processing algorithm and (c) lighting conditions.

As in photographic film cameras, low ISO speeds produce very low noise. Instead of chemical grains, however, high ISO settings force the processor to amplify a weaker signal. It now fails to



The nose on the left is 'noisier'

recognise the difference between real-image data and noise, and therefore, amplifies everything leading to a lousy picture. In more technical terms, the lower the signal-to-noise ratio (S/N), the noisier the photos.

About all the DSLRs (digital single lens reflex cameras) in the market give you images with minimal noise at lowest ISO settings – about ISO 100-200. Certain compact digital cameras work best at ISO 50-100. The newer digicams often give noisy

results if you try ISO 400 or above and only look good if you take really, really small printouts. After all the technological advancement, the rule of thumb still stands – more often than not, lower ISO settings will usually lead to photos with less noise.

### Selecting an ISO Speed

A camera is usually the most sensitive at values like 400, 800 or 1600 – depending on the one you’ve got. This is the coolest setting for taking pictures indoors with no fears of ending up with blurred pics. But you will find the images a little ‘grainier’ – although it’ll look okay on the LCD display at the back. If you select ISO 200, the camera will function more normally – perfect for indoor photos (with a flash, of course) and fine for daylight scenes yielding smoother pictures. The lowest speeds found on standard compact cameras are typically, 50, 64 and 100. These are meant for long exposures or large apertures to get better pictures (nights would be a better time to try this one out).

### Conclusion

So, as you can see by now, you can’t understand apertures, shutters or ISO speeds in isolation, because they are all inter-related and help you get the optimal exposure for that perfect picture. But these are just the basics. There are many more features that cameras provide, which, once you learn to use them, would make you a better photographer. But that calls for another chapter, so read on.

# Camera Features

If just pointing and shooting gave you images of absolute perfection, photography competitions would have vanished ages ago. Although you may not prefer signing up for any of those, but you'd still want to take better pictures, right? Well, then you'll first have to get a grip on the features that your camera offers you, and how best you can put them to use.

Digital camera features differ greatly from model to model. Some might be indispensable, while others might be required for highly specialised applications. However, no digital camera worth its microprocessor would lack the very basic features, viz. image stabilisation, exposure compensation and flash sync.

## 3.1 Image Stabilisation

Picture this – you're waiting in line for hours to see your favourite movie star to take his / her picture. The moment finally arrives and you take the snap... but damn! The photo is out of focus, and the celebrity looks like a bad dream. What went wrong? Probably, shaky hands. Besides, if there's very little natural light for the camera to use, the camera would inevitably slow down the shutter speed, lengthening the exposure time which could be disastrous. In such circumstances, you could try tucking your elbows up against your ribs while taking a shot (this looks pretty weird, but often helps to keep the hands steady). Alternatively, you could just use the IS feature on your camera.

### What is Image Stabilisation (IS)?

Camera manufacturers have come to the rescue with something called image stabilisation (IS). IS is what Canon (the first to produce the Optical Image Stabilization technology) calls it. Nevertheless, different manufacturers tag it differently ( VR – or Vibration Reduction in Nikon, SSS – or Super

Steady Shot in Sony, VC – Vibration Compensation in Tamron, SR – or Shake Reduction in Samsung and Pentax, Mega-OIS in Panasonic, etc.). However, the most common substitute term for Image Stabilisation is VR.



No IS means a blurry bouquet



IS really makes the roses bloom

### The functions of IS

Image stabilisation performs the function of counteracting movement that could lead to a loss of sharpness in the photographic image. Typically, IS could allow you to take handheld shots with the shutter speed set to at least two stops lower than if image stabilisation was off. VR has no real effect on exposure, but only assists in making the resultant image a little sharper.

Besides, if you try something bizarre like taking a photograph of a moving subject with a slow shutter speed (like a 1/15 shot), your subject would still be blurred. IS doesn't correct the shaking of the subject, just the camera.



A Nikon camera with VR

This feature could be either built into the lens itself, or into the body of the camera. There are three basic kinds of image stabilisation options in cameras – optical (built into the lens), digital (using software algorithms) or mechanical (using moving sensors).

### Optical Image Stabilisation (OIS)

Cameras with optical IS use hardware to counter the movements of the camera, usually using gyro sensors and a micro-processor. In such cases, the OIS changes the optical path to the sensor when it senses vibration during exposure, and therefore, succeeds in offsetting the effect of the shake. This is built into the lens itself. The advantage here is that a camera with a lens-based VR mechanism is usually built ground up, keeping in mind the requirements of the particular lens.

Nikon and Canon cameras use a floating lens apparatus that moves orthogonally (at right angles) to the optical axis of the lens with the help of electromagnets. Shakes and jerks are perceived by gyroscopic sensors, which are basically piezoelectric angular velocity sensors (crystals that undergo mechanical stress when exposed to a fluctuating electric / electromagnetic field). This, of course, serves well for the minor vibrations of our hands – but would be no good if you rotated the camera around or jumped around with it. VR, in short, can typically only correct vertical shake.

### Digital Image Stabilisation

The trick here is not to use any extra parts, either mechanical or digital at all. Digital Image Stabilisation merely heightens the camera's sensitivity by adjusting the ISO speed to get a faster shutter speed. The camera senses the vibration and does this on its own accord. The trouble – a high ISO could lead to noise and poor image quality. Rather than stabilising, digital image stabilisers just try to minimise blurring by using software akin to the ones photo editors use after the picture is taken. Digital image stabilisation only really comes of use, or makes a notable difference, in certain digital video cameras (camcorders) which 'pixel shift' the image frames to stabilise the video image while shooting; that is, buffering the motion of the camera by using pixels that are outside the visible frame of the shot.

### Mechanical Image Stabilisation

This anti-shake system is hardware-based again. However, instead of getting the lens to jiggle in tandem with your hand, the image sensor itself moves to compensate the vibration. This system has a significant advantage over others — any lens compatible with an image-stabilised camera body can be used to replace the old one. However, if the VR mechanism fails, you'll have to send in the entire camera body for repair whereas in the OIS system, it's just the lens mechanism that would need to be fixed.

### Non-Linear Editing Systems

Non-linear editing systems are software programs like Photoshop, Photoline and GIMP. These are used to correct images by inferring the stabilised image and minimising the motion blur due to camera shake. These, of course, are after the fact and not a measure of your photographic skill. However, if your photograph is a victim of vibration, and you're using a non-VR camera, then it's highly unlikely that any amount of editing could save it.

### What to remember about IS

Camera manufacturers, and in particular the marketing guys, like to impress the customer by talking about vibration reduction, which is now increasingly packed into low-end compact digital cameras. The fact is that, IS in digital SLRs can help in (a) taking sharper photographs of static subjects in low light conditions (and the flash is not in use), (b) taking clearer photographs from a train or a moving car and (c) taking better pictures while using a lens with a long focal length.

However, it just doesn't work when the subject itself is moving fast. Static subjects can make great pictures if you set the camera on a tripod and give it a slow shutter speed (and therefore a longer exposure) – and so you don't need IS at all. Fast moving subjects can only be caught with a fast shutter speed, rather than image stabilisation.

## 3.2 Exposure Compensation

Every digital camera goes through a process called 'exposure metering' or just 'metering', which is nothing but the camera

measuring the brightness of the lighting of the scene you photograph and adjusting itself to give you the proper exposure. In a digital camera, the image sensor electronically measures brightness at every pixel in the image and arrives at a single exposure value for the entire picture. Let's stop for a bit and understand what exposure values are all about.

### Exposure Value (EV)

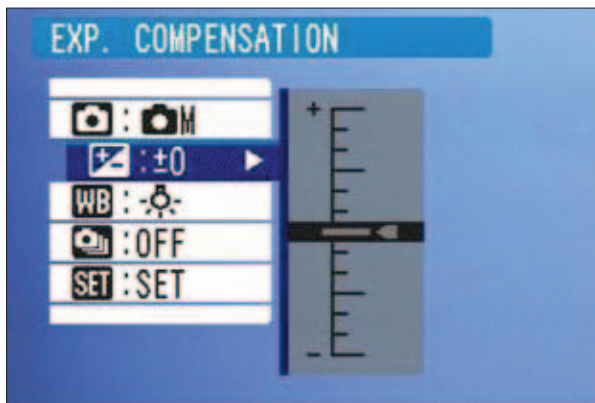
Exposure values are just numbers assigned to particular fixed combinations of lens aperture and shutter speed. As seen earlier, there's a range of combinations of shutter speeds and aperture values that yield the same final exposure. Exposure values reduce the need to remember shutter speeds and aperture values and f-numbers. For example, an exposure value zero (EV 0) means an exposure time of 1 second and the aperture value  $f/1.0$ . Similarly, EV 1 is either  $1/2$  seconds and  $f/1.0$  or 1 second and  $f/1.4$ . The table below lists a few familiar EV numbers.

		Aperture Value																	
Shutter Speed		1.0	1.4	2.0	2.8	4.0	5.6	8.0	11.0	16	22	32	45	64	Exposure Value				
	1	0	1	2	3	4	5	6	7	8	9	10	11	12					
	2	1	2	3	4	5	6	7	8	9	10	11	12	13					
	4	2	3	4	5	6	7	8	9	10	11	12	13	14					
	8	3	4	5	6	7	8	9	10	11	12	13	14	15					
	15	4	5	6	7	8	9	10	11	12	13	14	15	16					
	31	5	6	7	8	9	10	11	12	13	14	15	16	17					
Standard	60	6	7	8	9	10	11	12	13	14	15	16	17	18					
	125	7	8	9	10	11	12	13	14	15	16	17	18	19					
	250	8	9	10	11	12	13	14	15	16	17	18	19	20					
	500	9	10	11	12	13	14	15	16	17	18	19	20	21					
	1000	10	11	12	13	14	15	16	17	18	19	20	21	22					

Metering only creates information. The digital camera allows you to either adjust the settings as you think fit, or does it automatically. However, there are occasions when the camera fails to accurately detect the intensity of light (subject luminance) in all its variations. This may lead to overexposure (the picture appears too light and white) or underexposure (dark all over). This is where exposure compensation helps you out.

### Maintaining a balance – manually

Exposure compensation settings allow you to adjust exposure for situations that might confuse the camera's auto-exposure calculations. This gives you the dual benefit of letting the camera find its own way and yet taking over when the job gets a little challenging.



Auto, yet manual

The exposure compensation button (or menu option) allows you to override the metered exposure. Light metres don't see colour – just 18% middle grey. Exposure compensation allows you to increase the EV in a step-by-step range of up to  $+2$  or  $-2$ . Exposure compensation is represented as a diagonally crossed square with a plus and minus symbol on either side of the line.



The Exposure Compensation symbol



On the menu it could look like this

Most digital cameras today allow you to compensate the exposure by 1 to 2 exposure values, plus or minus, in  $1/3$  or  $1/2$  increments. Generally, positive exposure settings are ideal for scenes that are predominantly bright and negative exposure settings for subjects in which large parts of the scene are really dark. For this, a little deft use of the histogram utility would go a long way.

## Histograms

The histogram feature in your camera can be really helpful, especially when trying to arrive at the ideal exposure for a shot with ambiguous lighting.

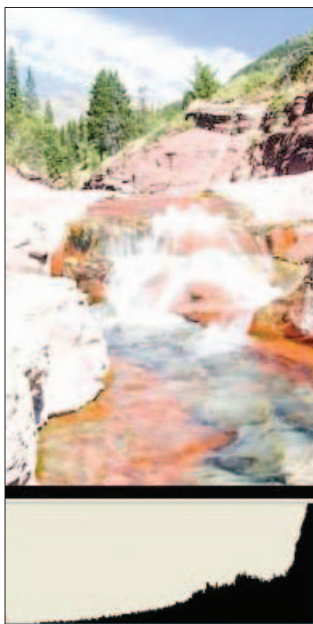


Histograms give you peaks and valleys of light and dark

The histogram is a straightforward graph that shows you bright and dark areas of the picture. This is displayed from darkest to brightest (left to right) on the horizontal axis. The y-axis displays how much of the image is found at a particular level of brightness. The histogram is usually split into



This histogram shows that very little of the photograph is in the (preferable) middle range



Too much exposure could lead to sunburn

check out its histogram, you'd figure out what exactly is going wrong with the exposure. You can then choose exposure compensation mode (a horizontal line will appear next to it with the number zero) and increase or decrease, as you feel fit. There is no such thing as a perfect histogram. You could use the histogram as a reference and take several shots of the same subject with different exposure compensation settings.

five segments. With digital cameras, you can re-adjust the exposure compensation and shoot after reading the curve of the histogram.

An overexposed image will show you a graph that peaks to the right with all the pixels bunched up and appearing to run off the edge. Such an image would be a victim of 'blooming' which is the overflowing of excess light into surrounding pixels.

Similarly, underexposure blacken most of the image.

If you take a test shot and



Left of centre means darker representations

### 3.3 Flash sync and intensity

Practically, all digital cameras include a built-in electronic flash (also called a strobe light). A flash has two principal purposes: (a) to light up a subject when there's not enough available light, and (b) filling up light in the dark areas and shadowy regions of the scene (flash fill). In short, the flash adds to the intensity of the available light or provides an even lighting to ensure a consistent exposure to all elements of the photographic image.



Typical high-end flash for a digital SLR camera

Here's a list of the typical flash modes usually found on digital cameras.

**Auto:** The camera decides when the flash is required and fires automatically

**Manual:** Gets the camera to flash even if there's plenty of light around, using the flash as a fill-in to eliminate the intrusive shadows that could mar your photograph.

**Slow Sync:** The camera judges exposure by measuring the light from the flash, and not from elements in the background. This ensures that the exposure occurs as if flash was turned off, and then at the end of the exposure, before the shutter closes, the flash is fired to light up the foreground subject.

**Red-eye:** 'Red-eye' is a phenomenon which occurs when light bounces off the retina of the eye of a subject and cause the eyes to appear red. The 'red-eye' flash mode reduces the red-eye by either firing the flash twice or thrice in quick succession before the actual shot or by turning on a small white light on the camera. The first method is far more effective.

**No flash:** Disables the flash if you don't think it's going to help. This is good for shots with minimal light (sunsets, city life at night, etc.).

#### How the flash works

Earlier, the badly needed flash of light was provided by ignit-

ing a wad of magnesium powder by hand. Later, flash bulbs were provided, which contained magnesium filaments which were electrically ignited via a contact in the shutter. But these were strictly meant for single use.

In today's hi-tech world, flash units use electronic Xenon flash lamps, through which high voltage electric current is passed to produce a bright flash of light.

### What is Flash Sync?

Flash Sync is short for 'Flash Synchronisation' and refers to a flash at the same moment that the shutter is fully open to admit light on to the image sensor inside. If it's a mechanical camera, the flash receives a message to fire through an electrical contact in the shutter mechanism. In the early days of photography, the camera had to be set to B (bulb) mode and the surroundings made completely dark. In digital cameras, an electronic timing circuit takes the message from a shutter contact. The sync terminals are wired to electrical contacts that complete the electrical circuit and fire the flash when the first shutter curtain fully opens. Other flash units known as 'optical slaves' are light triggered, and thus do not need an electrical connection to the main flash unit.

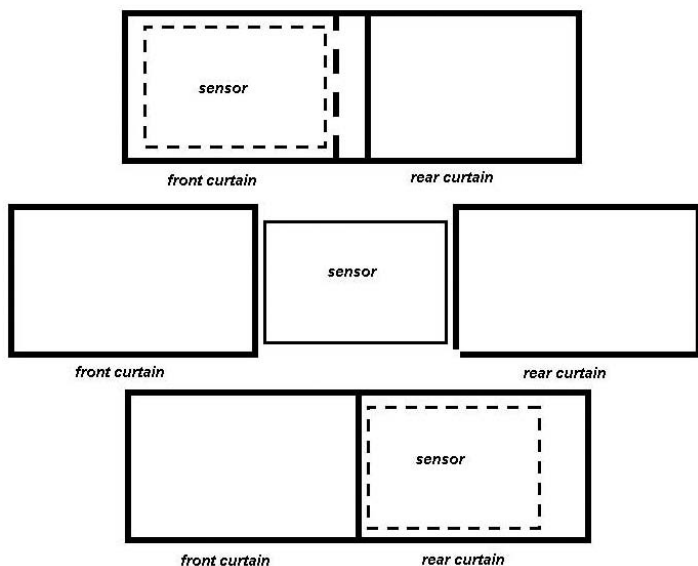


The electronic flash is an integral part of your digital camera

Flash sync speeds are measured in fractions of seconds and the only camera setting that the flash sync speed impacts is shutter speed. Each camera comes with a maximum sync speed beyond which your shutter cannot go, unless you turn the built-in flash off.

### Shutter Curtains

Focal plane shutters are typically made of two 'curtains' – a front curtain and a rear one. The front one opens to start the exposure and the rear one closes up behind it to end it. Usually, the flash sync fires at the same moment as the opening of the front curtain and is known as 'front curtain sync'. However, certain cameras set the flash sync to fire just before the rear curtain closes known as 'rear curtain sync'.



Shutters are often just a couple of shifty curtains

Sometimes, when you take a snap of a moving car in the night, you'll find the headlights appear to be trailing ahead of the subject. This is because of front curtain sync occurring during a long exposure. Except for such occasions, front cur-

tain sync works fine for most flash-photography. Rear curtain sync works quite well for stopping motion.

### **X sync**

X-sync or Xenon Synchronisation works with the electronic flashes in typical digital cameras. The best part about X-sync is that xenon flashes respond more or less instantaneously. The timing of the contact, therefore, coincides exactly with the moment that the shutter is fully open, usually at a shutter speed of 1/60 or lower. Several cameras today, offer an X-sync speed as high as 1/500. If your camera has an electronic shutter, X-sync speeds can be significantly increased.

Cameras that offer faster sync speeds are neither better nor worse – they only give you more options to play with. Higher sync speeds help control the brightness of the background, while maintaining normal flash exposure in the foreground. If you have a camera which provides you with higher sync speeds, you could use a higher ISO or a larger aperture to maintain the same exposure to ambient light while increasing the sensitivity to the flash.

Faster sync speeds also allow you to move farther away from the subject and / or use less flash power, thereby augmenting battery life. For every single ‘stop’ increase in sync speed, you can open the aperture up by one f-stop because you now have a 30-40 per cent increase in range. However, for daily use and point-and-shoot purposes, the built-in flash in your camera is enough for fill and you needn’t bother fiddling around with the sync speed at all.

To summarise this section, sync speed has the most significant benefits for shots in daylight (due to the better fill) and stopping motion (due to the emphasis on the subject in the foreground).

# File Formats

## 4.1 Raw

A raw file is the unprocessed data from your camera's sensor. Very few point-and-shoot cameras offer the raw format as an output option. One such example is Panasonic's Lumix DMC-LX3. Many dSLRs offer the option of raw output, but in different formats depending on the make and model of the camera. There are a wide range of extensions for raw files, which are often undocumented so that only the camera can work on the data. The raw file, is simply put, the image as captured by the sensor, without artificial corrections like interpretation of the picture from the sensor (demosaicing), white balance, brightness and contrast. These aspects of the image are processed after the image is captured on the sensor.

For many professionals, the raw file is analogous to the negative in digital photography, and the wide proliferation of formats is a big problem. For example, Canon uses a CRW extension, Sony uses SRF and Panasonic uses a RAW extension. Most algorithms used to store and compress the raw data are proprietary, and consumers do not have access to them.

Saving files in the raw format allows you to capture everything possible from the camera, and then correct the image or process it later in the camera itself or using an image editing software. This means that the raw data has much more information about the image, and much more subtle gradations in the saturation and hue of the image, than in the compressed formats. Also, the raw format lacks any of the artefacts inherent in image compression to the JPEG and TIFF formats. However, raw data takes up more memory space than standard compressed files.

Raw files should be used primarily if you expect extensive editing work for the photo you are clicking. This means that changing say the brightness of the image, or the saturation of particular colours, will come out with a much higher dynamic range than it would have with other formats.

## 4.2 JPEG

JPEG is a format that is standard for storing images across a wide range of formats and applications. It is used as a base for more specific applications such as the MPEG video format. Digital cameras typically store images in the JPEG / EXIF format. The exif data of an image store information such as the camera make and model, aperture, shutter speed, flash status used and other details of the photograph. Most digital cameras use this format as an alternative to their native raw file format.

The major advantage with the JPEG format is that it is a lossy image format. This means that depending on the compression, different amount of detail can be stored in the image. The more the compression, the lesser will be the details that are manifested on the image. This also means that saving a file over and over again will result in a proportional amount of depreciation in the quality of the image.

Although compressing the image by compromising on quality is possible on a computer, cameras do not offer this option. Different resolutions are offered in most cameras so that you can choose a suitable option between quality and image size. If you are going on a long trip without carrying too many memory cards, save the images in the camera in a medium or small size of the image. If, however, you are shooting at a location where it is easy to transfer images to a computer, you can afford to use the largest image size available.

The JPEG image is saved in the camera after processing the raw data from the image sensor. This means that once the sensor receives the raw information, the camera processes certain algorithms like the file dimension settings, the white balance, demosaicing, red-eye reduction, certain image parameters, and then saves the file on the camera. Essentially, every JPEG file that is stored in your camera is not of the highest possible quality your camera can produce, because of the loss of information that occurs during saving the image, something that is inherent to the format.

To avoid this, store images in the raw data format where available. Most cameras come with imaging software that can work with the raw data files in the cameras. Another major problem with JPEGs is the appearance of artefacts on com-

pression, a grainier image than in the raw format, and a blurry or washed out feel to edges, especially apparent while taking images of text.

## 4.3 TIFF

TIFF stands for Tagged Image File Format, and is somewhere in between JPEG and raw in terms of quality. It is essentially a form of lossless compression. This means that when an image file is stored in the TIFF format, none of the original information is lost. Unlike JPEG, which supports only 8 bits per channel of single-layer RGB images, TIFF supports 16 bits per channel of multi-layer CMYK images. Another advantage of TIFF is that it is compatible with most image editing and viewing programs, and is more compatible than proprietary raw formats. Even PC or Mac is not an issue with TIFF. It is therefore widely used as the final format in the printing and publishing industry.

Most photographers do not shoot in TIFF in an effort to avoid in camera processing of the image. The alternative is to shoot in RAW and then convert to a layered TIFF to obtain a 'Master' to store on your computer. These days many cameras offer the option of shooting in TIFF alongside JPEG, and RAW. However, most offer only 8-bit layered quality due to space constraints. TIFF takes a longer time to write into the camera's memory too, so if you're shooting in TIFF, you can rule out taking several pictures in a row.

Summing it up, TIFF files open in almost any image editor, are largest in size compared to other formats, and they don't have JPG compression artifacts. The time to open the file in the image editor is also typically shorter than when opening a RAW file. Thus, if you are comfortable with the camera settings (e.g. white balance and exposure) and you don't want to do much post-processing, then TIFF is an option (though not a recommended one). Else, raw is better both in terms of image quality and size. TIFF, however, is an excellent format for scanning. It offers 16-bit scanning and these days there are many printers that offer the same quality printing. Back in the days of film, scanning to TIFF was the norm.

# How to shoot

## 5.1 Macro

A macro is a close-up shot of a really small subject, typically with a small depth of field. There are two important considerations to make with the regular point and shoot cameras. The first, and obvious step is to put the camera in the macro mode. This increases the aperture, and gives a very narrow plane of focus. The second step is to adjust the focus. Turn off the autofocus, when you click the photograph, as the autofocus is likely to get confused and take a long time adjusting when you take your lens really close to the subject. There is a very narrow plane of focus, which should ideally be towards the front of the subject.

While shooting outdoors, the two most common macro subjects are flowers and insects. Often, while photographing extremely small flowers, the camera can focus on the background foliage, or on blades of grass in the foreground. The leaves, thorns or other aspects of the flower may show up focussed, but the flower itself will be blurry. This difference will not be apparent in the small screen of the camera, and such mistakes tend to be discovered only after the photos have been transferred to a computer. Manual focussing is very important in macro photography. Do not hesitate to re-arrange the subject a bit to get a good shot. Ask someone to shield the flower from wind, if that gives you problems. Macro photography in the night is not a good idea, and the camera will cast a shadow on the flash for close-ups. It's a good idea to use reflectors to cast light on the subject. This does not need complicated equipment, tissue papers, paper or white sheets will do just great. If the flash is overexposing the flower, a good idea is to shield or mask the flash a bit using tissue paper, or covering half the flash with your fingers (this sometimes gives a red cast to the image). When it comes to photographing flowers, it is always preferable to take the lens closer rather than using the zoom.

Photographing insects is a bit tricky. This is because they don't stay still long enough to make elaborate adjustments.

Getting too close to them will drive them away. Get the settings ready, and take as many shots as possible. When photographing insects, it is a good idea to increase the quality of your photographs as much as possible. A large image size lets you crop to a relevant area better. If the insect is fickle, it's a good idea to go for auto-focus and hope for the best. Approach carefully, and with slow movements, click photos while approaching in case it gets away. If you are taking photos of insects in flight, track it with the lens of the camera and click. When it comes to insects, it is preferable to use the zoom as much as possible, then move in with the lens.

By and large, try to click photos around the afternoon. This is when the light is ideal for macro photography. At noon, the shadows are too harsh. Also, remember that going in too close is not always a good idea. Capturing a bit of the background can make the subject stand out.

Photographing non-nature macros are relatively easy, and let you do more preparation. This is where you can set the background and the lights, as well as luxuriously take a lot of photos. You have a lot of time to experiment. The important thing here is to bring out the details in your subject. Look at where the light is falling, what aspects it is highlighting, and where you are focussing. Experiment with focus brackets here, that is, take a number of shots with a different focus settings.

## 5.2 Telescopic

Modern day point-and-shoot cameras have a healthy zoom available. Filling the frame with remote or inaccessible features of a landscape is all well and good, and indeed the only way to get these shots, but there are many more uses of the zoom feature.

While photographing people in action, like a cricket match, the zoom is very helpful in letting you take shots without getting in the way. Staying away from the scene of action is helpful while taking photographs of pets, children or candid shots of people without intruding or making them self-conscious.

When using this feature, an optical zoom is always preferable to a digital zoom. If possible, turn off the digital zoom

feature entirely, because the same effect can be obtained by cropping the picture on a computer. If you do not have digital zoom, zoom in only to the limits of the optical zoom. This is because the digital zoom throws up an image of a lower quality. Some cameras with a digital zoom have a feature that does not reduce the quality, but saves a smaller size version of the image. This is great as it saves on precious memory space as well. However, in general, using digital zoom is not advisable.

## 5.3 Portraits

Clicking portraits is one of the most rewarding aspects of photography. There are no rules here, but some essentials. It's important to make sure that the face is getting plenty of light. There are elementary mistakes that are made on outings, where many pictures end up with the face in shadows simply because the photographer did not ask the person involved to take off a cap. Whether or not the person is looking at the camera, make sure that the eyes stand out, and some light is reflected off them. Instead of taking the camera closer to the person, stand back and zoom in. This makes sure that features such as the nose and the eyes are not exaggerated.

The portrait mode in your camera blurs the background, but keeps the subject in focus. This draws attention to the person, but capturing the background is a good idea in some circumstances, especially if it adds some personality to the portrait. If you are taking portraits for print, make sure to have a healthy amount of background. If however, the portrait is for sharing over the web, fill the frame with the face.

A portrait is not necessarily just the face from the front. Diagonal frames capture movement, vertical frames capture rigidity and firmness, whereas horizontal frames capture tranquillity and peace. Use these appropriately when taking portraits. For example, diagonal frames work great with people in movement or in some vigorous physical activity. Don't overuse this approach though. People sleeping, eating, or indulging in some activity that involves only the upper body go well with horizontal frames. Close ups of the face work well with vertical frames. These are, however, just general guidelines. Experiment heavily with framing, capture only a fraction of the face, use

exotic lighting effects, frame them off-centre or try out a different angle. Bring out the individuality in the photograph as much as possible. An important aspect of portraits is to make the subject comfortable rather than self-conscious. Crack a joke, surprise them or give them a compliment just before clicking. The least you could do, as a photographer, is to engage your subject and ask them to smile. Just clicking away “candid” shots while people go about their business is no way to take a portrait – their attention should not be towards something specific out of the frame. Also experiment with expressions. This works very well with young children.

## 5.4 Landscapes

When it comes to landscape photography, the rule of thirds is most relevant. The rule of thirds is an aesthetic principle, where subjects are better represented off-centre, instead of being right in the middle of the photograph. This means if you are taking a photograph of the horizon, it is more pleasing to set the horizon along the top third of the photograph or the bottom third of the photograph. If you are photographing seascapes for example, positioning the sky for two thirds of the photograph gives a good impression. Similarly, when shooting the layout of the land from a high vantage point, it makes sense to let the land occupy the bottom two-thirds of the photograph.

How the elements closest to the camera are handled or composed into the shot dictates the overall mood and feel of the landscape. This can be a fence, a signpost or a building. Experiment with taking shots that are not at eye level in such cases. If there is a distant object of interest, like an animal or a human being, include them in the shot and compose accordingly. Placing such animated objects in the middle of the landscapes is a good idea, but not a general rule.

In most landscapes, the sky is a very important element. Photographing during sunrise or sunset yields best results. At the same time, the interesting colours are reflected from the ground and the objects on it as well. A bland, naked sky will simply spoil the landscape, especially if there are too many objects cluttering the ground. Make sure that the top half of the image has something interesting.

The easiest way to spoil a landscape shot is to take a diagonal shot of the landscape. This need not even be intentional. Even a slight tilt in the camera while framing a landscape can ruin the photograph. The easiest fix for this is to carry around a tripod. These are lightweight, and will significantly improve the quality of your photographs. If a tripod is not available, make sure that the horizon is as horizontal as possible before clicking. This simple check can bring about dramatic differences in the quality of your photos.

The “landscape” mode of your camera gives a deep focus, which means almost everything in the frame will be in focus. If you want to bring out the expanse, make sure to include objects close to the lens. This could be a rock, a tree, or even much larger objects like a cliff or a mountain. Changing the focus settings to focus on a narrow plane of focus dramatically changes the landscape. While this is not normally done, when implemented, this effect makes the photograph look like a shot of a miniature set. This is because the narrow plane of focus is normally associated with macro photography. This technique is called tilt-shift photography, and gives great results when experimenting from high vantage points taking photos of cityscapes or urban areas.

## 5.5 Night

Taking photographs in the night can be a challenging process. Even while indoors, the night time can give bad results. One of the most common mistakes is that the flash is so bright that everything within the frame is exposed. This is a result of a too powerful flash in many cameras. This can be countered by a very thin piece of paper over the flash, or a strip of scotch tape. Another common mistake is that the white balance in the camera is not adjusted for the light. Focus on a blank sheet of paper, or change the white balance settings according to the source of light. When taking photos in extremely low-light conditions, it makes sense to use a tripod and ask the subject to stay still.

Most night photos require high ISO settings, so a tripod is almost a must. The photos tend to be grainy and shaky even with a tripod. When taking portraits at night, make the person stand approximately four to six feet away, then zoom in

and use the flash. This works on many levels, making sure that the flash is not blinding and giving the face a more natural, flat appearance, instead of a bulbous one, when the subject is close to the camera.

The night-time is also the best time to capture streaks of light. This can range from a line of traffic to fireworks or a meteor shower. For all such cases, keep a very high ISO setting, the camera on a stable surface or a tripod. Invest in a clicker, which stops the camera from shaking when you click the photograph, and makes it easier to hold the clicker pressed if you are using a custom ISO setting.

If your photograph has not come out great, don't lose hope. You can always recover detail by digital manipulation. Increasing the brightness and contrast usually does the trick. You may also have to correct the colours a bit, because photos taken at night tend to have a greenish or bluish hue.

## 5.6 Action

When it comes to action shots, a high ISO is absolutely essential. This means that the object is not blurred when the shot is taken. Also, you will have to use a zoom lens so that you do not interrupt the action. Track the movement with your camera before taking the shot, and while clicking. This makes the background blurry, but in the direction of the movement, accentuating the movement of the object.

Experiment with angles here, tilting in the direction of the motion will also help depict the movement better. The essence of the image here is to capture the action. If your zoom permits it, capturing the expressions of the people during concentration makes for great, and sometimes funny photographs. If all your camera permits is a wide shot of the entire ground, or you are positioned very far away from the action, look for other interesting subjects in the foreground (say, an interesting spectator) and make the action itself the background.

When capturing kids or pets in movement, take a series of photographs, using the burst mode at times. You can delete the ones you don't want later on, but this increases your chances of getting a good shot. Position yourself in such a way that you are not intruding in on the action, and use zoom where necessary.

## 5.7 Architectural

Architectural shots are all about angles. The most boring kind of architectural photos are taken head on, and in close up. If the subject is in an urban area, go back a bit, walk around the building a few times, and look at options for getting into a building to get a shot. The colours are very important here, but they can be adjusted later on. Try to get an eccentric angle, if the subject is eccentric. Repeated patterns filling the frame can be impressive, but only if the angle looks aesthetic. Avoid monolithic shots of a single subject dominating a frame. Instead, get some of the background. Top down architectural photos are more interesting than bottom up architectural photos.

Approach the photo according to the subject. If the subject is a rustic rural building, capture an expanse of the rural landscape to go with it. If it is an impressive, but old building, focus on the features on the building itself, like the windows, statues or the roofs. If the building is a modern or industrial structure, include a chimney, cars or some people in the snapshot to bring out the industrial or urban look in the photo.

When it comes to architectural shots, you can go wild focussing on tiny details. Observation is the key here, look out for interesting oddities in the building to capture. This could range from a door frame, to a signboard or a light fixture.

Be careful while photographing heritage structures and religious monuments. Taking photos inside many religious structures is not allowed, and is insulting even if there is no sign that says so. By and large, heritage sites should not be a problem, but while capturing frescoes, be polite and turn off the flash in your camera. When possible, buy postcards, because you are not likely to get better photos anyway. Photographing in some public areas is also not allowed, for example railway stations. Though you might not encounter anyone who will stop you, it is not a good idea to take photos as it is illegal by law.

Architectural photos offer a lot of room for framing. This means that a building can be framed from the gate, or a fort framed from an entrance in the wall. Explore both symmetric and asymmetric compositions.

# Shooting Modes

Cameras typically employ two main shooting modes — single and burst. Both of them are meant for different situations.



Shooting modes are usually available in the user interface

## 6.1 Single shoot

The single shooting mode is most commonly used by photographers. This mode is selected by default when you turn the camera on. As the name suggests, it sets the camera to capture a single image on each click. This works great in stable environments without sudden movements where there's a chance of a photo going bad.

## 6.2 Burst Modes

The burst shooting mode is also known as Continuous shooting mode. This is available on most cameras. This mode lets you take multiple shots without having to repeatedly click.

Using these modes is simple. In the shooting mode, set the camera to either Burst or Continuous mode. Now to click the photos, simply hold the shutter release and don't release it till you get the right shot. All the images will be stored on the memory card like normal photos.

Burst modes on most cameras are not unlimited. The performance of the burst mode varies from camera to camera. The burst mode shooting capabilities are usually described as frames per second. For example, 3 fps means that the camera can capture 3 images per second. The other number mentioned with this specification is the total number of images that can be captured all in one go.

The burst mode is great for high action scenarios like a car race or a fast soccer game where there is too much activity. Here, you can take a sequence of photos and later choose the best from them.

### Limitations of burst mode shooting

Although the burst mode aids in getting a better photo, there are a few disadvantages as well.

First, there are several photos generated at once. This only adds to the confusion and managing these photos is a nightmare. If you have a camera with a mechanical shutter, then burst shots can be damaging in the long run.

With numerous photos being shot, you also waste a lot of memory space. With memory cards for cameras also fairly limited, wasting memory is not an option.

One of the other problems faced with burst mode is the use of flash and also exposure settings used. Sometimes, the flash takes long to recharge, so a burst sequence might be too short for the camera to charge the flash before the next shot.

The problem with shutter speeds is also similar. If the current lighting isn't sufficient for a good shot, then one of the ways used to increase exposure is to increase the shutter speed. If the shutter speed is greater than a certain value,

then you may not be able to set it. For example, if your camera can capture three images per second, then the shutter speed for each of the shots can't be two seconds or even one second for that matter.

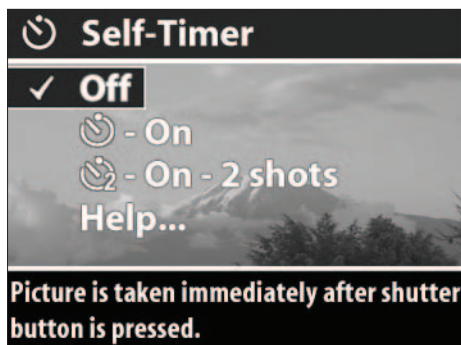
Be sure to have enough space on the memory card to store the sequence of images and also to have a memory card that has high data transfer speeds.

## 6.3 Multiple shooting mode

Cameras these days come with a time-lapse feature with a mix of timer and burst mode features. This feature allows users to have photos taken at a fixed interval. This comes handy in time-lapse photography. You can use this to take a time-lapse sequence of a day cycle or a budding flower. Again, this depends on the camera and more importantly on the amount of free space on the memory card. Time-lapse photography is best attempted with the camera stationary, so positioning and alignment is very important.

## 6.4 Self timer

In case you need to capture a photo after a time delay, the timer feature comes in handy. This feature has been in use even before digital cameras came along. The self-timer feature on cameras lets you click a photo after variable time intervals. Some even let you click two photos at the end of the timer period. First select the timer mode you want, then half press the shutter release to focus and then fully to start the timer.



The self timer feature can be used to automate the shutter release function

# Focussing

Focussing is an integral part of photography irrespective of manual, or automatic digital cameras. A camera focusses by adjusting the distance of the lens from the film or sensor of the camera. Depending on the distance of the other objects and the kind of lens used, the objects around the subject of the photo will appear out of focus and blurred. With digital cameras and also with automated film cameras, focussing is done by the camera itself. These days, all cameras come with auto-focus systems. When you partially press the shutter release, the camera focusses on the target, after which you can proceed to click the photo.

## 7.1 Focussing modes – Continuous / Single focus

Cameras usually have two modes of focus. They are basically settings that tell the camera when to focus. Focussing in cameras is done when you first press the shutter release half way through but without actually clicking the button.

Cameras should only focus while you click a photo. This is the setting that can be found on your camera under the setup menu of your camera. Turn it on and the camera will only focus when you half press the trigger when you are about to click a photo.

In the continuous focus mode, the camera lens is constantly adjusting itself to focus on the object in front of it. This option can also be enabled under the main setup menu in your camera. Focussing times are cut down a bit. Some cameras use the continuous focus mode as a pre-focus system where the camera partially focuses on the target to cut down focus times when you are about to click the photo. This is useful when you trying to focus on moving targets.

Both focus modes have a few advantages and disadvantages. The continuous mode forces the camera to constantly

keep adjusting the lens. This means more wear and tear and also continuous use of the battery. In the long run, the camera will run out of power. The flip-side is that focussing will be instantaneous and you won't have to spend time on half pressing the button and then pressing the shutter release.

## 7.2 Auto Focus – Spot focus / Area focus / multi-spot focus

Focussing manually is both slow and sometimes not as accurate. It's difficult to determine whether the target is focussed by looking at a small screen or even through the eyepiece. Automatic focus in many ways is a boon for photographers and it has significantly reduced the confusion. Cameras use a couple of techniques to try and focus on the target. They are not always perfect and accurate, so you should change the type of focus depending on the kind of lighting and subject you are shooting.

### Spot Focus

The spot focus is a single focus point used by the camera to latch on to the subject. With this focus mode, the target or object in the centre of the viewport or eyepiece gets focussed. This is a very good way to focus on most close ranged products to avoid results with depth of field but sharp images. If you want an object focussed, but not placed in the centre of the view, then focus on it first and without pressing the trigger, move the camera to a new direction and then click the photo.

### Area Focus

The area focus mode is very similar to spot focus. Instead of focussing a single spot in the centre of the view, it takes on a larger area from the middle of the view. This works for most photographs where accurate focus on a single spot is not necessary.

### Multi-spot focus

Multi-spot focus includes multiple spots to focus. This is not typically the most suited mode to shoot photos with.

### Face / Smile detection

Newer cameras have automatically focus on people. Some manufacturers call it face detection for use in a crowd to automatically focus on faces. Some others work a little differently. There are some cameras that detect smiles and automatically capture the image as well.

## 7.3 Light metering – spot / evaluative

Exposure and lighting measurements are vital to taking good photographs and is essential to every single photo. Sufficient light is required by the camera to result in a satisfactory



Metering and focussing modes can be set through a button-combo on most dSLRs

image. On a digital camera, light metering is the feature used to measure the amount of light.

### Spot light metering

Spot light metering measures the light in a small central section of the view. Depending on this, all the other parameters to correct exposure such as the aperture size and the shutter speed are altered. The only issue with using spot metering is that if the central part of the view is focussed to an extremely dark or well lit area, then the compensations made, may affect the rest of the image and you end up with either an overexposed or an extremely underexposed image.

### Evaluative light metering

Evaluative light metering works by measuring lighting conditions within a larger area in the view. This is more accurate for the most part, and is widely used. With this way of evaluating the available light, there are rarely hotspots or dark-spots.

## 7.4 Manual Focus

For expert photographers who want to be able to control the amount of focus and the object to be focussed, the manual focus feature is what matters the most. This is a feature found on every DSLR and some of the high-end point-and-shoot cameras have it too.

Focussing on DSLRs is done by first setting the lens unit or the camera body to manual focus. With that set, the motor is disengaged. You can then rotate the focus ring on the camera till your target gets focussed.

The manual focus feature can't be found in every P&S camera and focussing is also different in this case. There is often no ring to rotate on the focussing lens. To enable this, set the camera to manual mode. Set the rest of the settings such as the ISO, aperture size and shutter speed as you wish. Then, use the focus button if there is one till you switch to manual mode. A small scale or indicator will then be displayed at the bottom of the screen. The distance of the object in focus will be mentioned. Either use the directional keys on the camera or a gradually rotate the jog dial till the target is in focus.

Macro focussing is slightly tricky as the distance to the objects is at its minimum. In P&S cameras, turn on the macro

shooting mode before trying to focussing on the target. You will only be able to focus once you get close enough to the object. This depends on the range of your lens. This applies to both DSLRs and P&S cameras.



Manual focus and image stabilisation can be turned on by the flip of a switch

# Time-lapse

Time-lapse is not photography *per se*, it moves into the realm of movie making. Time-lapse is a very powerful medium to document extremely slow moving natural phenomena, the most common being cloud movement, blooming flowers and rotting fruits.

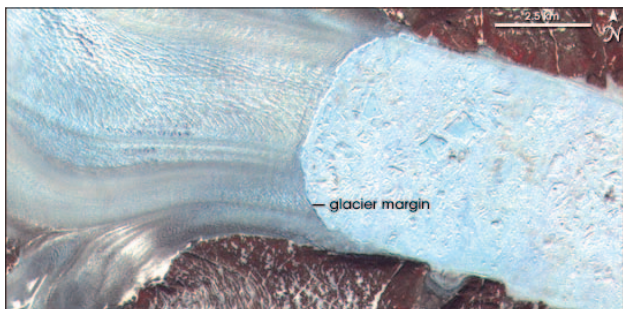
The concept is to take a single image with a significant lapse in time, and then sequentially play the images at a standard rate of 24 frames per second (fps) in a video. This means that a large number of photographs have to be taken across a span of time. At a frame rate of 24 fps, you would need 1440 pictures to make a one minute video. However, for most practical purposes using a frame rate of 16 fps produces equally dramatic results.

Many cameras in the Canon Powershot series, a handful of Nikon and Pentax cameras, and two Nikon Coolpix models come with a time-lapse option. However, you can take Time-lapse using any camera, and don't need to use a preset function for this purpose. A usual prerequisite for taking a good time-lapse is a tripod. The next step is choosing a good subject.

You missed the best times for taking cloud time-lapse in India by a month. The month of October has a lot of different currents at different altitudes providing those evolving cloud time-lapses that you have seen. A sunset or a sunrise is always a good subject. Other probable subjects include any work of art in the making, such as paintings, graffiti or *rangoli*. Blooming or rotting flowers, rotting fruits, curdling milk are all good and well documented subjects. Also, consider crowds, traffic, and traffic in the night time. If you are willing to spend a little more time with your time-lapse, consider a building being constructed or a growing plant. Anything that moves slowly, or changes slowly over a vast period of time is a great subject for time-lapse.

Once the subject is chosen, the most difficult part of time-lapse comes into picture. This is deciding how many pictures to take and how often. If the chosen subject is the sunset or cloud motion, then a photo every fifteen seconds is ideal. Consider a photo every five seconds for fast moving subjects like traffic or crowds, the more you space it out, the less will

be the illusion of smooth motion, and more jerks will be noticeable in the final video. If you are taking a time-lapse of rotting fruits, then it depends on how long the fruit will take to rot. A construction site can be spaced out enough to take a single photo every day at the same time across a year – for a 22-



June 19, 2005



July 7, 2003



A time lapse of a retreating glacier

second film. Basically, estimate the amount of time for the entire duration of the phenomenon you want to capture, figure out at what rate appreciable change appears in the object, and factor in the total length of the film before you decide on how many photos to take and at what interval. Be generous in the number of photos you take, but be very accurate about the spacing between each photo.

The idea of most time-lapse videos is to have the camera as still as possible, though this is not essential. Despite using a tripod, you would still inadvertently add some shake, so it is a good idea to use the remote control to click, rather than by pressing shutter release with your hands. If there is no remote control, then it is a good idea to invest in a remote trigger. This is just a chord that allows you to click by pressing a button that reduces a shake on the camera.

A decent trigger can be purchased for as little as Rs. 150. The next thing you will require is a timer. Do not try to mentally estimate the time required for the time-lapse video. Some cameras may have a timer, which can be set up using a remote control, but this is a rather complex approach. The best thing to do is use a watch and take a shot every few seconds or as and when the situation demands.

If you plan to take long periods of time-lapse photos, or to take many of them on a single trip, it would be a good idea to reduce the file size of the photo to the minimum. This helps free up some space, and leaves a lot of room to experiment and play around with. However, you can also use high resolution images to generate HD time-lapse videos, but do this in familiar surroundings where transferring images to a digital medium is at hand. Take as many photos as possible, to ensure you are content when you make the final video.

An intermediate step between shooting and making the time-lapse video can be editing the photos on a photo editing software. This can be used to correct exposure or colouring problems, or to give a particular hue to the entire time-lapse video. A high contrast black and white time-lapse video of cloud movement can be more powerful than a blue and white time-lapse of the same subject. This might be frowned upon by the purists, but then, this is one of the most significant advantages of digital photography.

There are software available for making time-lapse videos out there. One free software that can be used for this purpose is VirtualDub, (<http://www.virtualdub.org>). Start the program, go to File > Open Video File and check 'Automatically Load Linked Segments'. Then, open the first file from the series to be used in the Time-Lapse video. The program automatically loads the other images if they are serially numbered. A time-lapse video can be created in Windows Movie Maker, but the lowest duration allowed for importing a photo is 0.125 seconds, which can be a pain. You need to render the movie, and then speed it up using the speed filter. You can use any video editing software for this purpose. Most video software will render the video in a much lower resolution than the resolution you selected, which is ideal for uploading on the internet, or sharing with friends via email.

Once you are familiar with time-lapses, you can move onto more advanced things. Play around with the exposure timing of the camera. Using large exposure timings on things like crowds or a waterfall to give a blurred effect to the video, and accentuate the sense of movement. Taking a long exposure time-lapse video of moving traffic on a road during the night will make those trails of white and red come alive with movement. For most time-lapse subjects, a long exposure will have little or no effect as everything is moving slowly anyway.

Experiment with time lapses where the camera is stationary inside a moving vehicle – like a train journey or a long drive with friends captured from the dashboard. Moving the camera itself while shooting a time-lapse, even a basic movement like a pan or a zoom is going to give some startling effect to the time lapse. Usually, professionals use programmed and customised rigs for this effect, but there is no reason why you should not experiment with your digital camera and tripod. Try rotating the head of the tripod by a fraction of a degree between shots, or moving the tripod itself.

## 8.1 HDR

HDR stands for high dynamic range, and preserves the details of an image across a wide range of luminosity. For example, a façade against the backdrop of a sky during dusk will give an image where either the sky is too bright and the building is

too dark, or vice-versa. While there are a few cameras that allow native support for HDR photography, this is beyond the scope of most amateurs. This section discusses how to artificially produce HDR photographs, using an image editor and any digital camera.

The first question to put out of the way is where HDR should be used. Practically, all photos taken during harsh lighting conditions, either too much or too little light comes under the purview of HDR. Landscapes during sunsets or sunrise, indoor shots with a harsh afternoon sun streaming through an open window, and buildings at dusk or dawn all look better with HDR. Take a photo of the same subject under a high exposure setting and a low exposure setting. You will see a few details stand out in the first photo, and totally different details emerge in the next photo. An artificial HDR photo will combine the extremes, bringing out all the possible details in a real-world like image. Although they replicate real world colours, many HDR photos look artificial because of the way they are manipulated, and their colours being counter-intuitive to everyday experience with photos.

Taking multiple images of the same subject with different camera settings is known as bracketing. Some dSLRs come with a bracketing feature, that lets you take multiple photos in different settings automatically. Bracketing can be used with attributes other than exposure, like focus or aperture settings. However, most consumer digital cameras do not have a bracketing facility, so you will have to do this on your own. Three images in low, medium and high exposure settings is a bare minimum for producing an HDR image. If you want to be absolutely sure of capturing the entire range of natural luminosity in a subject, take upto six or eight different photographs on different exposure settings as permitted by the camera.

Photoshop has a feature that lets you combine bracketed photographs into an HDR image. Another way to create HDR photos is to bring out the details and the dynamic range with an image editing software. The idea is to digitally compensate for the exposure and then merge the areas with different exposures.

In this photo for example, details in the sky and the shadows under the bridge have been preserved because the

image is an HDR image made from multiple exposures, then tone-mapped.



An HDR Photo composited using different exposure brackets and tone mapping

## 8.2 Panoramas

As far as experimenting with photos goes, dabbling in panoramas can be a very rewarding experience. A normal panorama is a 360-degree view from any location. Digital panoramas can turn out to be very large in file size even with low resolution photos. There are many kinds of panoramas — there are sphere panoramas that cover 360 degrees in all directions, extremely high definition panoramas that are made by using a heavy zoom and over a thousand photos, vertical panoramas, and more exotic projections like the cube panorama or the planet panorama.

Many of the newer digital cameras, and even some mobile phones have an in-built panorama shooting function, but this does not extend to more than three photos, giving a very limited view, and not allowing for an automatic shoot of a 360 degree panorama. It is better to manually shoot 360 degrees and then stitch up the resulting images on a computer.

To shoot a panorama, take around twelve shots after changing an angle of about 30 degrees between shots. It is good to use a tripod, and a protractor too. Get out that geometry box that is collecting dust at the back of your drawer. However, none of these things are essential. You can simply take a good panorama by simply estimating the degrees. A digital camera allows you the luxury of looking at your photo before you take the next photo, so you can get a very fair approximation of where to point next. However, if you are not using a tripod, either take the entire sequence of shots very rapidly, which also helps if you have moving subjects in the frame or make sure that you align the shots using the horizon or some other reference. Getting your photos out of alignment will lead to a panorama like this, which looks pretty ugly.

There will always be some mistakes in the alignment, even if you are using a tripod, so it makes sense to crop out the excess areas using an image manipulation tool. However, don't depend too much on this while capturing a panoramic view.

Now a panorama does not necessarily have to be a landscape from a high altitude. It can be the middle of a market (you will have to be fast), a cityscape from the top of your terrace, the interior of your room, or anything that you want. To capture really memorable images of a monument, for example, take a panorama with the monument in the centre, and a friend in the foreground.

Remember to use the lowest filesize possible for your photos, to save on space in the camera memory and to save a lot of time processing the panorama later on. It is also a safe bet to do two sweeps of the area you want a panorama of, in case you miss out a portion of it. One very important precaution is to set the white balance manually to a constant setting so that you don't have a wide range of brightness across the photographs on the automatic setting. This is particularly important while taking panoramas with the sun in the picture somewhere. Although

this can be easily corrected digitally, in many cases, especially in landscapes, this causes an unnatural colouration.

Once the images are taken, copy them to your computer, and you are ready to make the actual panorama. There are many free and commercial software for creating panoramas available on the internet. Panoramic tools is widely used, but requires a front-end like PTGUI. Another software for panoramas is Hugin. However, in our experience, nothing works out as efficiently as good old Photoshop. It can automatically handle difficult subject matter as leaves, grass and clouds, correcting the brightness errors in the photograph and churn out decent looking panoramas. In Photoshop CS3, go to **File > Automate > Photomerge**, select the files to be made into a panorama, choose the “auto” option as your Layout and click on ok. Photoshop will run a script and then automatically match up the images and generate a multilayered file. Flatten the layers, crop off the excess areas and save the file, and your panorama is ready. Reduce the image dimensions by half and slash the quality down to 70 to upload a panorama on the internet if you don’t want to use up too much space.

Once a complete 360-degree panorama is made, you can use the image to create a planet panorama like the one here. You have to make sure that the right hand side of the image matches up with the left hand side of the image perfectly for this to work. Make sure that the brightness and contrast of the two areas also match up. To save disk space, reduce the image dimensions by half before proceeding. Also, look at the width of your photograph in pixels, and create a new blank square image with the same dimensions as the width. The image should be as high as it is wide, or the panorama will not work. Then, drag the panorama onto this image, and stretch it so that it occupies the entire height of the image. Now go to **Filter > Distort > Polar Co-ordinates** and select “Rectangular to Polar”, and your planet panorama is ready. You can alternatively make a cylindrical panorama by leaving a band of white space at the bottom of the image, and following the same procedure.

# Transfer and Printing

## 9.1 USB and Firewire

The most common method of transferring digital images from a camera to the PC, or for that matter, to any storage device is via USB. Most of us are familiar with USB; but for the uninitiated, here is a quick primer. USB stands for Universal Serial Bus, and is an industry standard used to interface devices with a host computer. It functions via standardised interface sockets. While there are several receptacle types within USB, the Series A and B are the most commonly used. Most digital cameras, however, use Micro and Mini receptacles that are part of the USB 2.0 standard.

You can transfer digital images to a computer via a USB cable, either directly from the camera or using an external card reader. To transfer images, connect your camera to the PC via a USB cable. Once the connection is setup, turn on the camera. It should go to transfer mode by default. Most cameras come with some sort of editing / picture management software that you need to install. If such a picture management application is not installed on the system, the camera is detected as an external storage device. After this, it's a simple matter of copying files like any other flash drive. There are also some proprietary docks that are essentially USB devices meant for



Types of connectors (l to r) Mini-B plug, B-type plug, A-type receptacle, A-type plug

transferring pictures, except that they also charge the camera. USB offers fairly decent transfer speeds, although large data (read as 8 GB plus) might send you off to make some coffee while the transfer completes.

Firewire, on the other hand, is like a big brother to USB. It generally outperforms USB 2.0 in terms of transfer speeds and reliability. Hence, Firewire is a common connection these days for high-end digital cameras and camcorders. The interface is also known by the proprietary brand names such as FireWire (Apple Inc.), i.LINK (Sony), and Lynx (Texas Instruments), while its technical nomenclature is IEEE 1394. Transferring via Firewire is similar to USB. Locate the Firewire port on your computer. It resembles a wider USB port. There are basically three types of Firewire connections: Firewire 400, Firewire 800 and Firewire S800T. All three are shaped slightly differently. However, adapters are available. If your camera supports Firewire, you probably have the cable bundled along with it. Plug one end of the Firewire cable that came with your digital camera into the Firewire port, and plug the other end into your camera. The rest is exactly as with USB.



## 9.2 Bluetooth / WLAN

The beauty of Bluetooth is that there is no need for cables, plugs, and all the precarious bending and reaching out behind the PC for sockets; not to mention less clutter of wires on and around your desk. Many printers, cameras, and laptops these days, come with Bluetooth connectivity. This allows you to print wirelessly and transfer pictures. To begin with, ensure that both devices are Bluetooth enabled. To switch on Bluetooth navigate the interface menu (usually LCD) of both the printer and camera and select the appropriate option. Next, pair both the devices. This can be done from either of the devices but it's best if done from the sending device, ie. your camera. Once the devices are paired, it's as simple as sending files via a Bluetooth phone. So, after the pros, let's look at the cons. Bluetooth, though convenient, does have its share of hassles. Transfer speeds are abysmally slow. So for all practical

purposes, use Bluetooth as just a spontaneous printing or transferring mode, if you don't have a USB cable. Also, the pairing of devices can be a bit tricky, requiring a bit of tinkering. And the connection once established, may not be very reliable.

There are a handful of digital cameras such as the Sony Cyber-shot DSC-G1 that allow you transmit photos over a wireless network using WiFi. Some of the newer WiFi-enabled digital cameras even let you send photos directly to an email address, or online photo sharing sites. WiFi lets you get over one of the most inherent crippling limitations in digital cameras - storage space. If your memory card is getting full, all you need to do is find a WiFi hotspot and you can offload all the data you want. One of the most important advantages of WiFi over Bluetooth is speed. So when you're faced with transferring 8 GBs of high-res images, all variants of WiFi will manage the job pretty quickly. But an 802.11 a/g/n camera is recommended. 'a/g/n' are the variants or protocols on which the WiFi 802.11 standard operates. WiFi is easy on the battery too, since it only operates in bursts while transferring. So, your battery, although being used up, will not dry out in a jiffy.

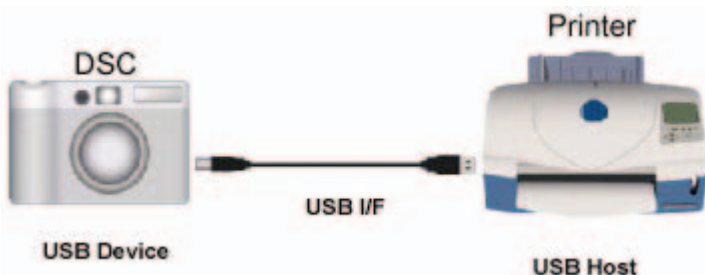
### 9.3 PictBridge

PictBridge is an industry standard that allows images to be printed directly from digital cameras to a printer, in effect bypassing the middleman — in this case, the PC. PictBridge operates through normal USB wires and connectors. Typically, a printer will have a type-

A connector while a PictBridge-enabled digital camera will have a Mini-B port. Once the two devices are connected, you can select and print images through the camera. For viewing and selecting photos, usually the camera's LCD interface is used. The user can navigate all the supported functions via menus on the LCD screen. The printer then retrieves the images from the camera and prints them. An advantage of Pictbridge is that it offers universal compatibility as each PictBridge device is automatically recognised by the other. To find out if a camera or printer is PictBridge enabled, look for the PictBridge logo on



the device or on the packaging or documentation. As more and more manufacturers are implementing the standard in their devices, printing directly from cameras and other devices is going to be quite common. It might even translate into printer manufacturers entirely doing away with memory card reader slots on printers. Overall, PictBridge seems to be a viable transfer and printing option with little or no drawbacks. If made to jot down some, then it'll have to be that while the printer is connected to the camera, it uses up battery. Also a few connectivity errors are known to crop up now and then.



2 Connection of PictBridge compliant devices

**Wide range of printing settings and information displays are available on the digital camera.**

The diagram shows a printer with two callout boxes. The left box lists information that can be displayed or selected, and the right box lists a wide range of printing settings.

**Information can be displayed/selected**

- Connection status
- Printer error
- Printing status
- Printing complete
- Message to disconnect cable safely
- Print cancel
- Resume from resettable error

**Wide range of printing settings**

- Print image displayed
- Print multiple images selected
- Automatic printing of DPOF specified images
- Index printing of all images
- Print all images
- Print a selected area
- Print multiple copies of the same image
- Print with a date stamp
- Print with a specified image size

## 9.4 AV-out / HDMI

Almost all digital cameras these days, such as the Sony W35S, come with an AV-out port. AV-out is provided so that you can connect the camera to a TV or any other display system that supports AV and view your pictures or videos directly from the camera. Once the camera is connected, switch to the video mode on your TV. Next, switch the camera to play mode. This lets you view your pictures or videos on the TV screen instead of the camera's LCD. There are, however, some things to keep in mind like the region specification. TVs usually use the NTSC or PAL system. India uses PAL, so make sure it's set accordingly. To change the settings, navigate the menu to go to video-out and select PAL. An AV cable has two plugs at one end. One carries audio (usually white) and the other carries the video signal (usually yellow). These two plugs go into the TV's 'AV in' receptacle. The other end goes into the camera socket. The AV-out feature comes in handy if you want to show your pictures or videos to a few people. It can even be used to stream whatever the camera's picking up directly to a large screen – very useful when dealing with a much larger audience such as a concert or gathering. You may or may not record the video, but can still stream it.



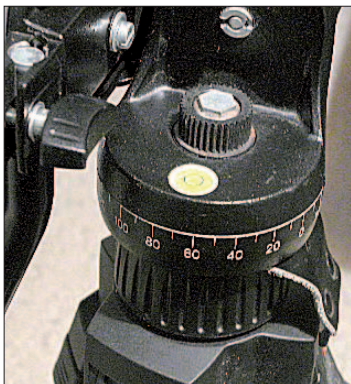
HDMI again is like the big brother to AV-out. Since TVs are surely moving towards High Definition (HD), cameras cannot be left far behind. HDMI first started appearing on still cameras around the beginning of 2006. These days, even decently high-end cameras, such as the Nikon Coolpix S60, come with an HDMI port. HDMI lets you transmit really high resolution video output to an HDTV or screen directly from the camera. HDMI stands for high-definition multimedia interface and transmits uncompressed digital data. It supports up to eight channels of audio and high clarity visual data with only a single cable. While AV falls short in really large screens, HDMI handles them beautifully. The real difference in quality between the two will be apparent only when transmitting to large (say 42-inch plus) HD screens.

# Camera Accessories

Once you purchase a camera, the next thing you need are the accessories and parts for it. The camera body, by itself, is hardly of any use. The accessories you purchase can compliment the camera, improve its function and sometimes are absolutely essential to photography in general. Some of the accessories are as follows.

## 10.1 Tripod

The tripod is one of the most important accessories a hobbyist should have, and something every professional or enthusiast photographer must own. The most important function of the tripod is to keep the camera as steady as possible. Shaky hands are common, and clicking photos with an unstable base almost always means blurred images. Tripods have a



A spirit level can be used to set the right balance for the tripod



Mini tripods like this are great for portable use

small stump and a mount that lets you mount any camera to the tripod. The mount is a universal standard, so technically, you should be able to attach any camera to any tripod.

Tripods prices range from Rs 1,000 to well over Rs 30,000. Prices vary depending on the kind of tripod you purchase. The

cheaper, lighter and compact tripods are usually made of plastic with a bit of metal framework. They aren't among the strongest, but they are great for casual photographers and professional who need to carry tripods for long distances in their bags. There are also tripods with flexible stands and compact stands called monopods. These a single-foot stand that is used to stabilise the camera.

Setting up a camera and a tripod are simple. First, extend the feet of the tripod to the height you want to place the camera on. Use locks on the feet to stop the tripod from retracting to its original form. If your tripod has a detachable mount, remove it and rotate the base to fit the camera. Next, simply latch the base mount back to the tripod in the right direction.

To set the camera, tripods come with a built in spirit levels. Some tripods, have two spirit levels for stability across all four directions.



**Monopod is a portable accessory to get for your camera**

## 10.2 Filters

Filters are basically add-ons that fit over your camera lens and are used to enhance the camera's capabilities. Clear lens filters are used to protect the camera lens from dust and dirt. Lens filters are also used to alter the colour and tint of the image captured.

There are many other kinds of filters. UV Filters and Polarizers are two of the well known ones. UV filters are used to cut out or reduce ultraviolet light. They are usually used to reduce hazy results. Polarizers help in darkening images. Contrast and saturation are usually increased with the use of polarizer filters. Diffusion filters are used to soften the look of photos. Filters are also available for a few point-and-shoot cameras, but they are limited to mostly colour tint changing and for protecting the lens.

The advantages of using filters are obvious but many believe that they also deteriorate quality can cause image warping.

## 10.3 Memory - SD / MMC / XD / CompactFlash

Memory is absolutely essential for cameras and it's even more so today with the resolution of cameras significantly increasing. 10 MP point-and-shoot cameras are standard today. The file size of a typical photo from one of these cameras can be well over 3 to 4 MB. Memory cards are now cheaper and capacities have gone up a lot. 2 GB is sufficient for most users and 4 GB is recommended.

dSLRs also store JPEGs, but they are better known for capturing RAW files. RAW files are uncompressed, store better quality, and therefore, much larger than JPEG files. Some dSLRs use CompactFlash (CF) cards to store data. These are less compact than the SD/MMC and xD cards.

Unfortunately, not all brands use and accept the same standard of memory in their cameras. However, the most commonly used memory is Secure Digital (SD). Secure Digital High Capacity (SDHC) is similar to SD, but the maximum capacity goes upto 32 GB.

xD-Picture cards are usually found on Olympus cameras. Sony has its own proprietary standard. These can be a little more expensive than SD. One should make it a habit to carry more than one memory card for storing and carrying.



SD-MMC-XD-Compact Flash - SD Memory



SD-MMC-XD-Compact Flash - SDHC Card



SD-MMC-XD-Compact Flash - Compact Flash



SD-MMC-XD-Compact Flash - XD card



SD-MMC-XD-Compact Flash - Memory Stick

## 10.4 Lens

Other than the camera body itself, the lens is the next most important part of the camera. A photographic lens is basically an array of lens elements put together. With point-and-



UV filters are cheap and a good way to protect the lens shoot cameras, there is no way to interchange lens. dSLRs have detachable lenses. This is advantageous as you can get specialised and quality lens attachments without depending on the one that comes with your camera. The disadvantage is that replacing and carrying the additional lens is a pain, and therefore, dSLRs aren't practical in everyday use. Setting up and using the lens for proper use is complicated as well.

There are several kinds of lenses available. The most common type is a zoom lens, which allows you to take photographs of distant objects. These are usually denoted by a number range. 18-55mm, for example, is the lens supplied with most entry-level cameras. Zoom lenses are also known as telephoto lenses. Wide angle lenses have little zoom and have the largest angle of view and a small focal length.

For capturing very close objects and in cases where a good control over depth of field is required, a macro lens is used. Macro photography is also called 1:1 photography as the objects should be more or less the same size as the sensor. Macro lenses are usually more expensive than standard lenses.

Fixed focus is another term thrown around a lot. A fixed focus lens



A 28-300mm zoom lens

doesn't let you focus or zoom. This kind of lens is known to produce great quality results and is known to produce good quality images for distant objects. There are a few disadvantages as well. It is difficult to frame the subject and the photographer needs to move to and fro. They are generally used on cheaper cameras where zoom and focussing isn't a problem.

Image stabilisation is a feature found in camera lenses and is of significant importance. Some brands call it image stabilisation, while others call it vibration reduction. The feature basically helps stabilise the image so there is reduced blur in the photos you take.

Another important feature that some users require is autofocus. Cheaper lenses do not come with an auto focus system. This means you have to manually focus on objects than the camera doing it for you. These might be great for experienced photographers but not for newcomers.

Using a lens is simple. It just fits in with your camera as long as it is one supported by the camera. There is usually a button that keeps the lens locked. Press it and then rotate the lens to remove the existing lens. Connect the other lens in the same manner after removing the covers for the end that fits into the camera. For an auto focus lens, use the slider on the lens to enable the feature.



A Canon macro lens

## 10.5 Lighting

For any kind of studio work, lights are absolutely necessary. Lights come in different colours, intensities and have all kinds of different looks. For almost every kind of light, you need to diffuse and break the light, so you don't get sharp shadows. You obviously need to try all kinds of lighting setups for your shoots. Diffusers and Soft boxes are the most commonly used accessories with lights. Diffusers are small plates that sit in front of the light source and are present with



A Softbox helps soften the light



Light stands allow adjusting of the level of the lights

almost every light that you purchase. A soft box is a big cloth box with a semi-transparent curtain in the front that reduces the intensity, but effectively reduces the harshness of the light. Reflectors are basically large sheets with reflective paint or material which is useful to lighten up dark areas.

## 10.6 External Flash

Every camera comes with a built-in flash unit that comes handy in poorly lit scenarios. Once you start using the ones built into modern dSLRs, you'll realise that the intensity of the flash isn't sufficient for larger areas. The inbuilt flash is only sufficient for close areas and small surroundings. For professional use, you eventually want a larger more powerful flash.

Almost all point-and-shoot cameras don't have a mount to attach a flash, but



Advanced flash units allow better control over the amount of light

dSLRs come with this mount along with the built-in flash. Fitting an external flash is as simple as sliding the flash unit into the horse-shoe mount on the camera. A wired connection is then required to receive the signal for firing the flash.

A powerful flash is not the only reason to opt for one. If you buy a cheap dedicated flash unit, then you might just get a simple flash unit. However, costlier flash units have many more advanced features built into them. Some of them have a display with options to change the intensity and other settings for the flash unit itself. Some flash units also sense light intensity. In many ways, the external flash is a separate entity by itself.

## 10.7 Portable Image-viewers

One of things that made digital cameras unique was the fact that you could view the results immediately after shooting a photo. There was no developing process involved. Every camera has a screen at the rear that can be used for viewing the shot.



Image viewers come with larger, better quality screens than the ones on the camera

Sometimes the screens on these cameras are of poor quality or are too small to be of much use. For such cases, there is a useful accessory that is getting popular. These are portable image viewers whose core task is to be able to read images off a memory card or store it on an internal movie and let you view them.

Some of the players come with an inbuilt hard drive that lets you transfer files and images from the memory card to the hard drive. They come with larger screens than the ones you find on your camera. Most of them support multiple memory card standards. Other than transferring images and viewing them on a larger screen, they offer many more functions like slideshow. Some of them double as portable media

players and some even allow basic editing and altering of images.

## 10.8 Remote control

The remote control on a camera is a better replacement to the timer. It allows you to be able to capture photos from a distance. It allows you to place the camera in places where the photographer can't be the centre of action like on a race track. This kind of functionality is especially useful for wildlife photography or sometimes even for timelapses. A remote control



Wired remote control allows the user to eliminate any shake created by the human hand

also means that the user isn't physically present with the camera so there is even less chance of any shake.

There are several kinds of remote triggers for the camera. Some of them are controlled through wire, but of late, most of them can be fired wirelessly.

The remote control is really simple to use. They are also very cheap and many of them start at as low as \$8 (Rs. 400).

Wireless triggers are also available for flash units. These are useful when you have a completely different lighting setup with more than a single light or the light itself is to be placed away from the camera. For this kind of remote control, the flash unit is replaced with a transmitter that sends the flash-firing signal to the lights. You also find extension chords and cables for flash units.

## 10.9 Batteries

Batteries are basically two types, AA batteries or proprietary batteries. AA batteries are easily available in the market, which makes it easy to replace drained batteries. Propriety

batteries are not easily available, and if you run out of charge, the only option is to recharge it. However, propriety batteries take longer to drain than AA batteries. Although AA batteries are cheap, they have to be purchased often.

Taking care of the batteries, and managing them properly is vital to the longevity of the equipment, and the amount of photos you can take at one charge.

Batteries drain out when they are in the camera, even if you're not using the camera. If your camera is kept in a shelf without being used, it's a good idea to store the battery separately. Low quality AA batteries may leak and ruin the equipment, or make it require a cleanup. Propriety batteries will lose charge over time, and when you take the camera out, you may realise that you have a drained battery. It makes sense to carry around a set of spares.

If you're using AA batteries, make sure that you use the same brands with the same amount of charge. Rechargeable batteries are a common solution for cameras that use AA batteries. While rechargeable batteries make sense economically, they also get drained quicker than AA batteries. Charging takes a long time too, so you might require two sets of rechargeable batteries. In this case, do not mix and match the sets, and replace an entire set every time you change batteries.

To increase the life of propriety batteries, charge the battery to the fullest (don't overcharge), then drain it completely and repeat the cycle. Purchasing an extra, or even two extra batteries at the time of purchasing the camera makes good sense. This means that you will have a battery to spare if the battery drains out, and you will not need to hunt for a battery later on. You might have to go out of your way to a specialist or enthusiast shop for obtaining a replacement propriety battery.

How you use the camera can increase the battery life dra-



**AA are cheaper but bulkier and heavy**

matically. If you're going on a long outing with no spares, it's a good idea to turn off the LCD display. Using just the viewfinder to take photographs will drastically reduce the power consumption of the camera. Turn your camera off when not in use, and don't waste power by reviewing your work. If your battery is critically low, and you still have to take photographs, compose the shot, turn the camera on, click the trigger, then quickly turn off the camera.

## 10.10 Battery Chargers

If you own a digital camera, chances are that you use a charger either for the AA batteries or the proprietary battery.

Always use the specified charger that accompanied the batteries. Eventually, the batteries will lose their capacity to be recharged. Manage sets of batteries in such a way, that they all have the same amount of charge and usage at any point of time.

Don't store batteries in the charger. These batteries will drain slowly, and may leak into the charger. Whenever possible use a reputed brand, and consult the manual of the camera for supported battery types. If the batteries are heating up when you charge them, replace the entire set, as this means that the batteries are of a low quality that can damage your camera. Completely charge a set, then drain it completely in the camera before charging again. Make sure that the charger indicates when the charge is complete, so you do not end up overcharging the batteries, which can make it heat up or ruin it.

If you are using a proprietary battery, it is very important to invest in another one. Follow the complete charge-drain-charge cycle for such batteries as well. Use the charger of the same brand, or the charger that came with the camera. Don't keep the battery for charging without monitoring the process, as overcharging can ruin the battery. Make sure that there is an automatic cutoff or some kind of indicator for a complete charge.

While traveling, and especially when traveling overseas, you might face problems with finding compatible power outlets. It always makes sense to invest in a plug, with multiple configurations of pins or a universal adapter.

# Camera Care

**C**ameras need to be handled with care and require periodic maintenance to keep them in good condition. Some cameras need extra care while handling. DSLRs should be serviced regularly. Point-and-shoot cameras, on the other hand, are a little simpler and have fewer things that can go wrong if not taken care of. Tasks as simple as wearing a neckstrap with the camera attached can prevent accidents. In the long run however, there are many other things that can be done to extend the life of your camera.

## 11.1 Lens cleaning and maintenance

The lens is one of the most important parts of the camera that requires the most cleaning. It is after all, the part that is directly exposed to the open when in use and also is directly linked to the quality of the image. Any dirt or marks on it will end up in some way or the other in the images you take. One of the ways you'll know is if your photos have unexplain-



A lens cleaning brush can help clear any dust on the lens

able blurry spots in all the photos.

As much as possible, the lens should not be touched. The lens cover should be on the lens at all times. If you have multiple lenses, then make sure the ones not in use are covered on both ends.



Lens cleaning kits for cameras are available

If you see any fingerprints or dirt on the lens, then use an air blower to gently blow the dirt away. For more stubborn dirt marks, use a fibre cloth or lens cleaning solutions. Never pour any solution directly onto the lens, but use a soft cloth dipped in the solution.

Even more care is to be taken when the sensor itself has some kind of dirt on it. Stains and dirt on the sensor



Lens cleaning kits for cameras are available

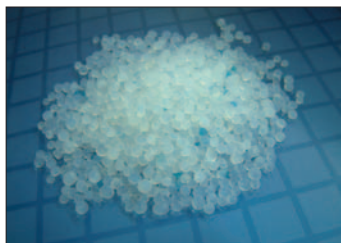


Sensor cleaning is necessary at times with a soft cotton bud

are comparatively rare, but if indeed you get any, it should be cleaned in a similar manner. You can wipe the rest the camera using a cloth. If there are any creases or gaps that can't be reached with a cloth, a soft brush or an air blower can be used.

Avoid carrying the camera to sandy places and especially keep the camera out for long in extreme temperatures. Also check the memory and battery slots for any dirt or sand. Use a blower to clean them. Avoid keeping batteries inside the camera for as long as months. Humidity and fungus are always a problem as far as storing cameras is concerned. Keep some silica gel along with the camera if possible.

It's also advisable to get the camera checked and



Silica gel helps reduce moisture and growth of any kind of fungus

cleaned at an authorised service centre every once in a while. Some manufacturers even sell specialised kits with everything needed to clean your camera.

## 11.2 Carry bag

The camera should be carried around in a bag as much as possible. Point-and-shoot cameras should be kept in a pouch, while DSLRs should preferably be stored in a carry bag. While purchasing a carry bag, you should look for one with compartments to keep the other accessories such as the flash, the lens and so on. If you are looking forward to purchasing even more lenses, then there should be provision for those. Some even have a small external strap made to hold a folded tripod.

A DSLR isn't something you put into a small pocket and carry along. A good photographer always carries the entire kit along. The carry bag should be sturdy and well padded from within, so different components of the camera don't brush against each other damaging themselves.

## 11.3 Microfiber cloth

Standard cloth isn't very fine and has a tendency to grab and hold on to sharp particles. When such a cloth is used, there is a good chance that you will scratch your lens or sensor. We recommend that you use a good quality microfiber cloth to clean your lenses and cameras. While cleaning the lens with a microfiber cloth,



Using a microfiber cloth is a safe way to clean the lens and screen

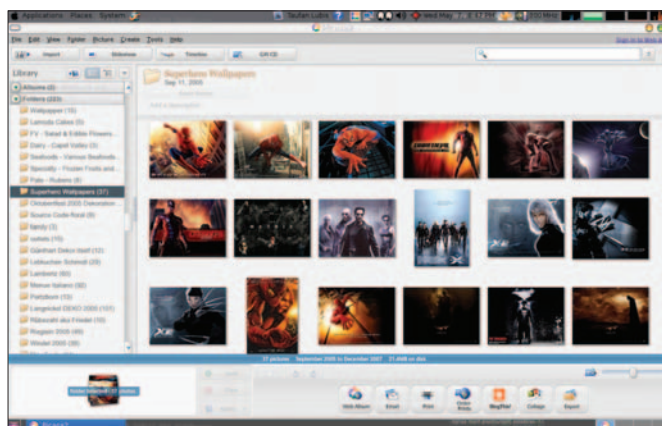
make a circular motion to clean the lens. Microfiber cloth is also used to clean LCD screens and other delicate items. Use a microfiber cloth to clean the screen on your camera every now and then. If you own a DSLR, it's also a good idea to purchase a screen-guard for your camera. Some cameras even come with a hard foldable plastic cover that covers the screen.

# Software

## 12.1 Picasa

Picasa is a photo management software by Google. It is designed for casual photographers to upload images to picasaweb — an online photo album. The program is packed with features, and enables you to noticeably improve photos before putting them up on the web.

Basic retouching features includes colour correction, setting the tone for the image and removing spots and blemishes. All editing done on the photograph is non destructive. This means that any changes you make to the image, will be copied to another file, and your original image will still be recoverable. You are also allowed to edit the same photo in different ways, and upload variations.



Picasa 3, running on a Mac

Picasa automatically catalogues all the photos on your system during start up. This can be irritating thing at times, especially, if it picks up all the graphics in a game folder or irrelevant images elsewhere on the system. Unless disabled, Picasa also picks up new images every time it starts, even in removable media. There are image management capabilities in Picasa, which include rating and tagging.

Once edited, the images can be uploaded for hosting online. A sync feature lets you synchronise changes made to folders on your computer, to changes made to albums hosted on the internet. You can choose to either make these albums public or private, and then send the links to your friends and families. Picasaweb is not as strong a community as Flickr for enthusiasts, but Flickr is not used for sharing personal photos to the extent Picasaweb is. If you are uploading photos to share with family and friends, and these photos are of an event or an activity, it is better to use Picasa for this purpose. However, if you are taking artistic photographs, and want professional feedback for your work, then Flickr is a better web site. Picasa allows you to resize the pictures before you upload them. Use this whenever possible to save on web space. The free service provides 1 GB of free storage. According to the site, this is enough for 4000 photographs, but a lot of photographs end up being over 1 MB in size, which reduces the number to a little less than 1000. When you upload the photographs from a standard digital camera, you might run out of web space in about twenty albums, which takes about a year of regular use. If you end up regularly uploading pictures on Picasaweb, you will eventually end up doing what a lot of people do, which is to have multiple Picasaweb accounts.

## 12.2 Adobe Photoshop

This one is the standard across platforms, as it is available for both Mac OS and Windows machines. Unfortunately, there is no Linux port yet. The prevalence of Photoshop is so much, that 'photoshopping' or even just 'shopping' has become synonymous with image editing. Photoshop's default format for saving images is PSD. This format allows layers, masks, certain effects, paths and colour profiles to be stored in the image itself. This format stores far more information than competing formats, and the wide use of Photoshop means that many image manipulation programs support this format. A user can also store notes and audio/video commentary in the image itself, which makes it easy for an image editor and a client to compare notes and work on a project together.

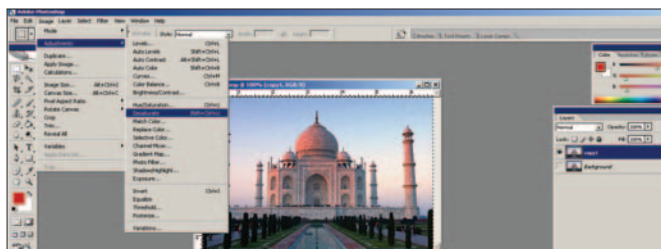
There are two primary ways to manipulate an image of Photoshop, the image effects toolbar and the filters. True photo-

editors don't touch the filters, and use just the image effects to bring changes to their photographs. Amateurs, on the other hand tend to use filters. Most regular users use a combination of both to bring about desired changes. Image adjustment adjusts various elements of the image such as brightness, contrast, hue, saturation and vibrance. Image filters apply a range of preset effects that drastically change the image, to even make it look like a sketch or a painting. There are also lighting effects available in the Image Filters menu.

Another important feature in Photoshop is the automation of some common image editing operations. This includes the merging of many bracketed photos into a single image (most commonly used for HDR) or making panoramas from a number of images. There are a few script files that handle tasks as compression or changing image dimensions. These scripts can be customised, or downloaded from the internet. Photoshop also has advanced batch processing capabilities, and it is possible to record a set of actions as a macro and repeat them over a bunch of images.

Another significant advantage of Photoshop is the sharing of user-created brushes, plugins, shapes and filters. There is a wealth of these available for download, some paid and some free.

Photoshop uses layers, which are stacked for image editing. These layers can be tweaked in various ways, parts of a layer can be made transparent or a blend mode can be applied to the layer for different methods of partial transparency. Layer effects allows text and objects to be highlighted in different ways. Masks are used to non-destructively edit a layer. That is the image information is not lost, but merely hidden. Paths can be used to create vector objects, but they have to be rasterised for the more advanced functions.



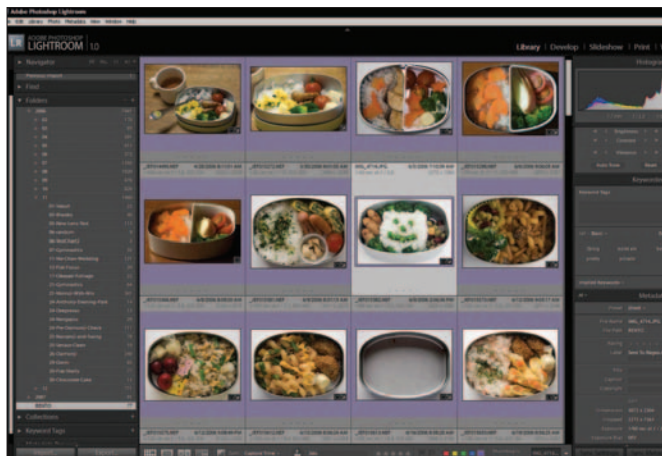
Adobe Photoshop

## 12.3 Adobe Lightroom

Adobe Photoshop, the industry standard for photoediting lacks one major feature that competing image editors have, which is a library for sorting, organising and managing photos. This gap is filled in by a software called Lightroom by Adobe, which is a very powerful photo manager. Lightroom is a non-destructive photo editor, like Picasa. The changes made to the photograph do not alter the actual photograph, but will be used for all practical purposes by the software, including exporting the amped up negative to Photoshop for further image editing.

The software has five modules for handling photos. The library module is useful for managing a large database of images. The image database is called a catalogue within the software, and instead of indexing all the photos on the system, which is the most common approach for the software, you can choose to bunch particular types of photos together into catalogues. This could be photos from a particular camera, photos from the web or any other source. You can also mix and match to create a number of catalogues with photos shared between them. There are powerful tagging features, which includes a colour code, ratings, flags, keywords and metadata. You can use these as filters for sorting your photos. A pane on the right allows for basic image editing, like exposure, tone and vibrance in Lightroom 2. You can also create custom filters and use keywords.

The develop module brings up more image retouching tools. These include cropping, red-eye reduction, spot removal and adjustments. You can also correct the exposure, fill light and other image properties of the photograph. There are drop-down boxes for advanced options such as tone curve, split toning and detail. The slideshow module lets you create elaborate slideshows, with transitions and timings, and lets you view or save them. The photos need not occupy the entire frame, and the slideshow features here are vast. The print module lets you process the image for printing. These include borders, margins and orientations. The web module automates a process of creating and exporting HTML or Flash based image galleries for the web. With Picasa around, the regular user may not use this feature, but for professional photographers, or serious hobbyists, this is a great feature to upload photographs on their own



**Adobe Lightroom**

web sites. There are a number of templates available for this purpose, and you can create your own. These templates are not mere changes in colours, size of the thumbnails and borders, there are completely different approaches to a photo gallery, ranging from a crammed up gallery to a slideshow with a single image per page. Lightroom lets you watermark your photos before uploading them.

## 12.4 Photography Software for Linux

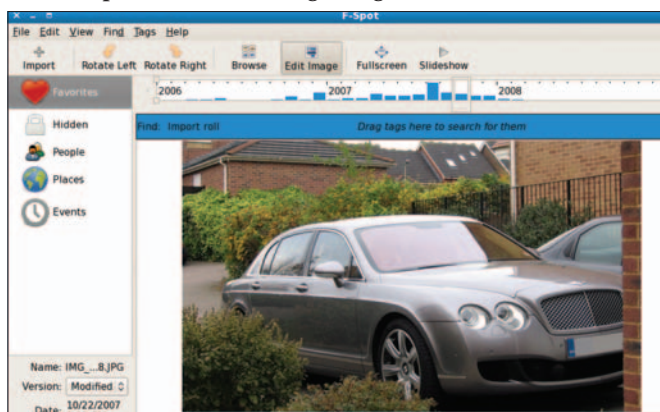
F-Spot (a play on the word f-stop) has become the standard image management software on Linux machines. The software is the default photo management software for the Gnome desktop, but provided the libraries are installed, will work for any desktop. Digikam is the default image management application for KDE.

F-Spot can be used to manage large collections of photos, by using tags, categories, colour codes and folders. Tagging is the most important feature here. You can have a whole hierarchy of tags, similar to a folder structure, and apply tags from across different tag categories. You can filter photos according to tags, and multiple tags at that. Rating individual photos, and then filtering by both rating and tags is available. You can also search and sort using the EXIF data embedded in an image.

F-Spot has some colour correction functions, and basic image editing capabilities such as red-eye removal and cropping. You can also save versions of a photograph, and upload to both Picasa and Flickr directly from the program. It is possible to burn a photo CD for playback on a CD/DVD player using the export menu. F-Spot also generates static HTML photo galleries if you want to upload photos to your home page.

Both Digikam and F-Spot work well with digital cameras, and can recognise and import from your cameras. If you are more comfortable with Picasa, Picasa can be made to work on Linux with Wine as a compatibility layer. If you are downloading the Linux version of Picasa from Google, go for the Windows installer and use that instead. Picasa works perfectly with Wine.

For more advanced image editing on Linux, there is a software called The Gimp. The Gimp supports plugins, layers and masks, and has many of the features that Photoshop has. However, the features are not as rich as Photoshop, and there is a definite difference in ease of use. The Gimp, however, can deliver most practical needs. Use The Gimp in a separate or virgin desktop, because the main window, the toolbars, and the layers window all open up as separate applications. The Gimp is totally free, and there is a version of The Gimp called Gimpshop which makes The Gimp look like Photoshop for Photoshop users who are migrating to Linux.



F-spot on Linux

# Web services for Photographers

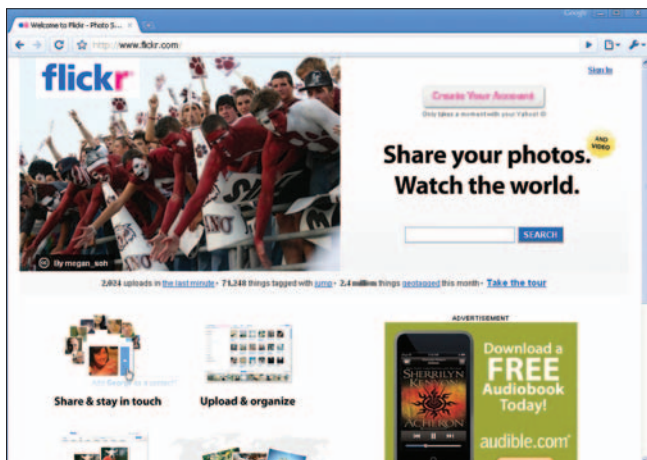
Photo albums and prints were means by which people relived their younger days and fond memories. Albums these days are virtual. Let's say, you're an amateur who's desperate to be called a *pro*. Or maybe you're a pro who wants the appreciation or criticism of peers. You may want your folks back home to see your new house, new friend or your new baby. And then again, maybe, you've got tons of images and you're fed up of juggling them in disk-hogging folders on your computer. For all of these problems, there's just one just place to go – cyberspace.

The World Wide Web has a plethora of services that allow you to store, exchange and do whatever a photographer would like to do with his/her photographs. Some of these are free and some come with a fee, but each one of them has something great to offer. This chapter is a handy guide to what these web sites have to offer.

## 13.1 Flickr ([www.flickr.com](http://www.flickr.com))

One of the most popular photography sites, Flickr started off in February 2004 as part of a game developed by Ludicorp, Canada called 'Neverending'. However, Stewart Butterfield and his wife Caterina Fake realised pretty quick that they had a good thing going with this picture sharing software. They put an end to 'Neverending' and decided to develop Flickr as an independent entity. Their foresight paid off and today,

Flickr is *one more addiction* for thousands of photographers all over the world. The name *flickr* is significant in more ways than one (a) in the sense of *flick* ( a movie), (b) the *flickering* of the screen or (c) flicking through the pages of your photo album – but none of these may have been the logic behind the choice of this interestingly misspelt name.



Flick through your pics with Flickr

In March 2005, Yahoo! took over Ludicorp, acquiring Flickr in the process, and this has only been icing on the cake. Some of the features that make Flickr exciting are:

### Tags:

Flickr allows you to *tag* photos. Tagging is using a form of ‘metadata’ – structured data attached to other data, making locating and organising much easier. This is also similar to the cataloguing that you’re used to seeing in libraries. You can add either single or multiple tags to the photos you upload. Tags serve as reference terms, simplifying search for particular kinds of photographs. This kind of collaborative creation of metadata is what netizens know as ‘folksonomy’ – and though Flickr didn’t really start it, it sure was a part of the leading pack.



This is how we tag it

Flickr also became one of the first web sites to implement 'tag clouds' – a visual representation of a collection of tags with the colour and font/font size of each tag indicating its importance or popularity.

05 amsterdam animal animals architecture art august australia autumn baby barcelona beach berlin birthday black blackandwhite blue boston building bw california cameraphone camping canada canon car cat cats chicago china christmas church city clouds color concert day dc december dog dogs england europe fall family festival florida flower flowers food france friends fun garden geotagged germany girl graffiti green halloween hawaii hiking holiday home honeymoon hongkong house india ireland italy january japan july june kids lake landscape light london losangeles macro me mexico moblog mountains museum music nature new newyork newyorkcity newzealand night november nyc ocean october paris park party people photo portrait red river roadtrip rock rome san sanfrancisco school scotland sea seattle sky snow spain street summer sunset sydney taiwan texas thailand thanksgiving tokyo toronto travel tree trees trip uk urban usa vacation vancouver washington water wedding white winter xmas yellow york zoo

It's raining tags

### Signing up:

This part is the smoothest. All you need to do is sign up with your Yahoo! id. If you don't have one yet, you'll either have to open one, or, give up pretending to act interested in photography web sites.

### Sets:

You can organise all your photographs into 'sets' in Flickr. So

how does this differ from other photography sites? Well, the simple fact that the same photo can be a part of several different sets. So if you've got a picture of a family picnic in Goa, you could put the photos in one set called 'Goa', and put the same photos in another set called 'Family tours', etc. These sets could be further grouped into 'Collections'.

### Organizr:

Another terrific feature in Flickr is Organizr – a web-app that is part of the interface and doesn't need to be specially installed. This feature allows you to change tags, sets and collections in your 'photostream' via a simple drag-drop facility. Besides, you can alter the tags of various photos at the same time and even put your photos on a world map using Yahoo! Maps.

### Privacy:

You can change your settings to suit your needs. This is easily done with the 'edit who can see what' link on the 'Your account' page.

Since March 2007, filtering of content has become stricter, so

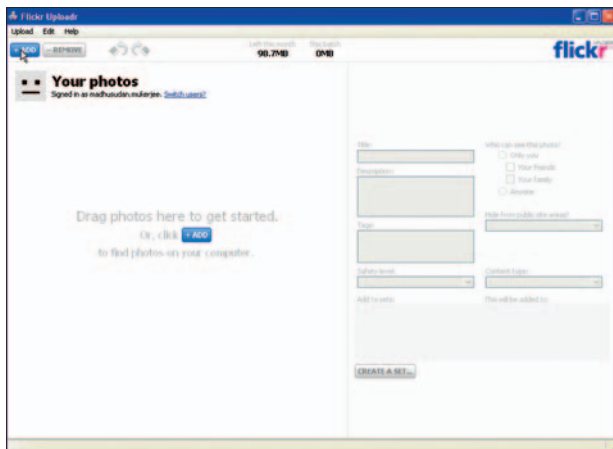
The screenshot shows the Flickr 'Your account / Your profile privacy' page. At the top, there's a navigation bar with links like Home, You, Organizr, Contacts, Groups, and Explore. Below this, the page title is 'Your account / Your profile privacy'. The main content area is titled 'Who can see what?' and explains that users can control who sees different parts of their profile. It lists several settings: Email address (set to 'Nobody'), Instant messaging names (set to 'Any of your contacts (default)'), Real name (set to 'Any Flickr member'), and Current city (set to 'Any Flickr member'). A 'SAVE CHANGES' button is prominently displayed. Below the settings, there's a link to 'Or, cancel and return to your account page'. At the bottom, there's a section for 'Activity' with links to 'Around You', 'In your Groups', and 'From your friends'. There's also a 'Bookmark on Delicious' link. The footer contains various links like 'Flickr Blog', 'About Flickr', 'Terms of Service', 'Your Privacy', 'Copyright Policy', and 'Report Abuse', along with language options.

Flickr allows private eyes too

members could specify the 'safe' value of their photos. Besides, if you're not a member – or if you are one, but are underage – you're always on SafeSearch.

## Flickr Uploadr:

If you don't want to put your photos directly on the web, you can pre-organise them with the Uploadr, which is a desktop client with a cool interface, complete, with tagging and all.



Load up before you log in

## Videos:

Since April 2008, Flickr allows you to upload videos with a size limit of 150 MB or 90 seconds in duration.

## Free:

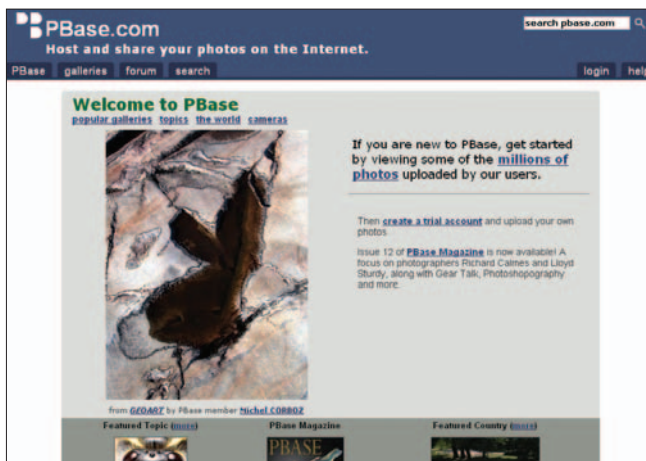
That's the magic word, isn't it? One of the prime reasons that people flock to Flickr with their digital images is because, unlike several photo sites on the web, Flickr charges nothing. If you're desperate to spend money, however – or need hi-fi tools to play and juggle your images with – you could upgrade to Flickr Pro for less than 25 dollars a year.

There's other smart stuff here too. You can order prints, which could be delivered to you at your doorstep. And not just prints. Flickr has partnered with several third-party vendors to allow you to get your photos printed on business cards, large size prints, photo books, posters, calendars, etc. Flickr's RSS and Atom feeds, its facility for posting photos to blogs, through emails and from camera-phones, all make the site a

photographer's delight. Besides, Flickr also uses an API (Application Programming Interface) which can be tweaked or expanded by non-commercial users. Also, being one of those photo-sharing web sites that is entirely compatible with Linux and Macintosh, Flickr is quite the universal favourite.

## 13.2 PBase (www.pbase.com)

This one started off as photobase with a '.org' generic domain in August 1999. It's now one of the top photo-storage/sharing sites on the web, and one of the few to endure the dot-com bubble-burst. Using Linux and Red Hat distribution on an Apache server, PBase was created – and is still maintained – by the husband – wife duo, Slug and Emily Lee.



Get your photos to touch Pbase

All you need is an email id to gain access to PBase and start uploading your digital delights. PBase has many features to brag about, but they're really humble in stark contrast with their stupendous success. In fact, PBase is so low key, you won't even find an article on it in Wikipedia.

### Simple:

The PBase interface is a no-frills, straightforward set of

options that is designed for pure functionality and professional purposes rather than mere amateur drag-and-drop. The 'full edit' and 'sequencing' buttons are great for primary editing purposes and anyone who knows English can figure out how to go about it.

### **Ad-free:**

Anyone who uses Flickr would know that it's pretty irritating to sign in to your account and see advertisements of the local matrimonial agency next to your favourite photographs. PBase is a paid site (23\$ a year for 500 MB of storage – which is less than a hundred rupees a month) and this is what allows the display to be clutter-free, solely devoting space to photography. Only sincere photography, therefore, is likely to be found on PBase and if you want to try it out, it's free for a month.

### **Pro:**

If you're planning to go professional – or already are a pro – PBase is a great place to be. All over the world, serious photographers – and people who are looking for high-quality photographs – tend to search PBase. The traffic and the number of hits that your photos will gather will surely make you feel like you've arrived. Besides, PBase allows you to sell your photos on the site and lets you provide information about yourself so buyers can contact you accordingly.

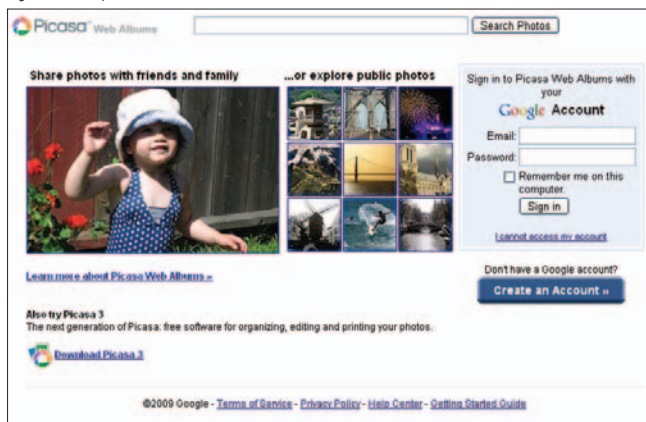
Indexed by search engines: The comments and titles you provide are traceable by popular search engines like Google.

There's more to make PBase stand out from the crowd. There are User Forums which let you post your ideas, questions and suggestions with the thousands of other photographers in the world. You can assign a password to your gallery which only friends, relatives or V.I.P.s can be told.

But it's got its share of negatives too. People who are used to the hyper-interactive and snazzy responsive colours of Picasa or Flickr would find the PBase look a little drab. Videos still aren't allowed and some Java scripts are blocked. Nevertheless, it's a fact that if you want to get your pictures sold faster, PBase is the place to be.

### 13.3 Picasa Web (picasaweb.google.com)

As is evident from the URL above, this is another fantastic product from the people at Mountain View, California – the Google guys. Also known as ‘Picasa Web Albums’, the word ‘album’ which is more associated with the physical kind, is often, understandably, given a miss. Picasa, evidently, is a clever blending of the words ‘pic’ (for ‘picture, obviously), ‘Picasso’ (remember that incredible painter?) and ‘mi casa’ (my house).



#### Another Google googly

If you're a Google-fan, you've definitely heard of – and downloaded – Picasa (now Picasa 3) and used it to organise your photos in your own computer.

Originally created by Idealab, Google bought it over in 2004 and has offered it to all Gmail users for free. Using your Gmail id and password, you can access Picasa. While Picasa 3 is one of their most downloaded products, Picasa Web Albums (PWA) is jostling for netSPACE with the likes of Flickr and Zoomr. Several features that have been integrated into Picasa help to make it among our top photo-sharing sites:

#### Free:

Unlike PBase, Picasa Web Albums is free for all to use – that's

if you only need 1 GB of space (but they do add ‘and counting!’ so the capacity seems bound to increase pretty soon). For anything more, you’ll have to pay.

### **Picasa 3:**

Picasa automatically scans your computer for all its images and keeps them on record for your easy access, in case you want to upload them to PWA. You can easily upload photographs using Picasa (or the Exporter for iPhoto or the Uploader on MacOS) and there’s no loss of the quality of the picture.

### **No Ads:**

No advertisements make you view your photographs and others in a clutter-free environment.

### **Sync to Web:**

The ‘Sync to Web’ is a feature of Picasa 3 ensures that the changes you make in a photograph are instantly incorporated into the copy of the photo that you may have formerly uploaded onto PWA.

### **Privacy:**

You can maintain your very own private album on PWA, letting nobody see them except yourself or your family. If you want someone else to have access to it, you could just email an “unlisted number” URL which is specifically assigned to your private album. PWA uses an “unlisted number” approach for URLs for private photo.

### **Multiple Word Tags:**

Finally, you can tag your pictures with multiple words (word-groups) rather than have them recorded as several different words.

### **Face tags:**

So you’ve got a picture with about a dozen friends in it and it seems tedious to put all the names in a tag-list. All you need to do is use Picasa’s face-recognition technology, which can be accessed using the ‘Add name tags’ button, and which

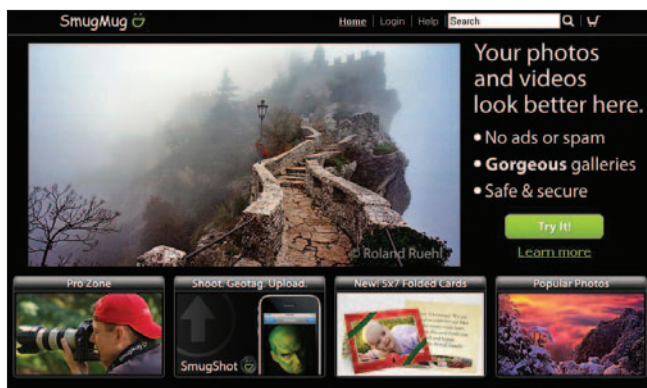
enables a face-recognition software to trace and frame faces in any given photograph. It freaks you out a little at first, but is fun once you start emailing these to the persons concerned.

### Upload to Blog:

You can use Picasa to upload your photos directly to PWA or to your web log on Blogger (Google's free blogging service).

## 13.4 Smugmug ([www.smugmug.com](http://www.smugmug.com))

Co-incidentally, this one started off as a video-game service too, but by the end of 2002, the Chris and Don MacAskill family's effort shifted focus to create one of the most popular photo-sharing sites on the web today, with more than 300,000 customers.



A place for mugshots and more

Like PBase, this one is a paid site, so it's definitely not for the 'okay-let's-take-another-photograph' kind of photographer. Smugmug's features are truly exceptional and need a mention here:

### Great 'Albums':

Smugmug actually scales the size of the photos in your account to suit the browser you – or any other viewer – are using. It offers you more than 30 themes for your gallery and allows you to magnify your pics to surprising sizes with

almost no loss in the resolution at all – a feature they call ‘SmugMungous’.

### **Professional:**

This is a site for the lion-hearted photographer who swears by his/her pictures and takes every shot seriously. You can price your photographs the way you like and sell them on Smugmug, enjoying full copyright on each one of them. This makes it a bit expensive though, because your free trial account is only for 14 days, following which you must sign up for either of three accounts – Standard (Rs. 1,900 a year), Power (Rs. 2,900 a year) or Pro (Rs. 7,300 a year). The great thing here, is unlimited storage.

### **Customisable:**

Pro and Power accounts are fully customisable. This means that you can even remove the Smugmug name and logo and add your graphics and colours as you please, ensuring that your gallery is truly unique.

### **No Ads:**

Not being dependent on ad-revenue is one of the major pluses of this site, ensuring that your photos don’t get mixed up with the latest weight-loss appliance in the market.

### **Video:**

Smugmug is with the leaders of the pack, now allowing HD quality video uploads.

### **Privacy:**

You can open your galleries for public view or limit it to family and friends. Besides, all offensive photos are filtered out.

### **Maps:**

You can post your pictures on Google Maps through Smugmug.

## **13.5 Snapfish (www.snapfish.com)**

More than 60 million members worldwide and more than 2

billion photos stored online, Snapfish is the only photography-based site created by ~desis~ in 2000 and bought over by HP in 2005. Snapfish was launched in India in 2007 and you can access it directly or through [www.indiaplaza.in](http://www.indiaplaza.in) (which used to be 'Fabmall'). Snapfish appeals to the Indian photographer.



Nothing fishy about Snapfish

### Free:

Snapfish allows you unlimited storage for free. Free editing tools and software are the icing on the cake. You even get your first 20 prints free – but the delivery charges, of course, are borne by you.

### Merchandise:

At a price of Rs. 2.95 per 4 x6" print, you could get high-quality prints delivered at your doorstep, usually within a week. You can get Snapfish to transform your photo album into flip books, stationery, T-shirts, posters, calendars, photo books, coffee mugs and note-cards. They'll even burn CDs for you and send them over.

**PictureMover:**

The Snapfish PictureMover is a great tool that can be set to automatically detect and move pictures from your computer, digital camera or cellphone directly to your online Snapfish photo albums.



Get your pictures moving

**Editing:**

You can tweak your photos to make them look better with editing tools on Snapfish that allow you to get rid of red-eye, change colours, etc. Besides, you can even add captions, which will appear on the reverse side of the prints you order. All of this, coupled with the really simple interface and the reliability of HP, makes Snapfish, understandably, one of the most popular photo-sharing sites on the web.

That pretty much covers the key photography services online – but not exactly all of them. We'll quickly breeze you through a few more that may just turn out to be the ones that suits your purposes.

**Photobucket (www.photobucket.com):**

Taken over by NewsCorp in 2007, Photobucket allows you to store 1 GB of photos for free – and videos too. You can upload from your computer, via email, Instant Messenger or your cell

phone. It's got hundreds of themes for your gallery and is reportedly the most popular photo-sharing site in the U.S.

**Zoomr ([www.zoomr.com](http://www.zoomr.com)):**

Similar to Flickr, Zoomr offers storage, editing, tagging and geotagging. It's even got its own blog (on which the creators of the site put up their latest updates) and 'Zoomr TV' – a Ustream service that allows you to access live video streaming of events online.

**Zenfolio ([www.zenfolio.com](http://www.zenfolio.com)):**

Great interface, unlimited storage and bandwidth, online community forums – this ad-free service is a paid site. More for the professionals – or people intending to go pro – you can buy and sell photographs too.

**DotPhoto: ([www.dotphoto.com](http://www.dotphoto.com)):**

DotPhoto is truly unique – it's a free site through which you can sell your photographs. You can exhibit your pictures through the 'DotPhoto Show'. You can 'print, create gifts, tell a story, share, build a photo web site, sell photos, host pictures, print books, store videos and more' with DotPhoto.

So now you know exactly how you can use your digital camera, how to take pictures and edit them, how to connect it to other devices and where to store them on the web. What we haven't told you yet is what exactly happens inside your digital camera when you take a picture – and that warrants another chapter.

# How a Camera works

People usually prefer digital cameras over conventional ones because the output is print-friendly, web-friendly, editable and inexpensive. However, going from film to digital isn't easy because there is a whole range of digital cameras available in the market today. Broadly, all digital cameras can be classified into two groups: P&S and dSLR.



The Sony Cybershot is a typical point and shoot digital camera



The Pentax K 100 D is an entry-level D-SLR

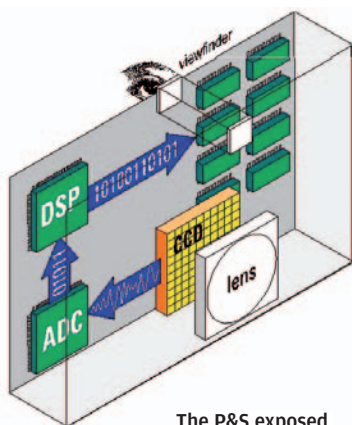
## 14.1 Difference between a P&S and a dSLR

The camera commonly flaunted and the one we popularly know as a 'digicam' is of the P&S variety. P&S stands for 'Point and Shoot' and they're called so for the obvious reason that all you need to do is point it at the subject and click.

So what exactly are the fundamental differences between the P&S and dSLR?

### The Lens:

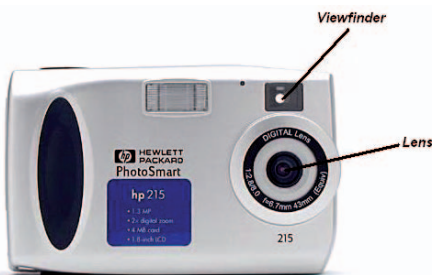
P&S cameras have lenses fixed to the camera body and integrate the shutter in to the lens. The lens of a digital camera, as with the traditional 35-mm camera, is of critical importance. Once you buy a compact digital camera, you're stuck with the lens you're provided. The best thing about dSLRs is that you can detach the lens with the press of a button and substitute it with any other lens to best suit the event.



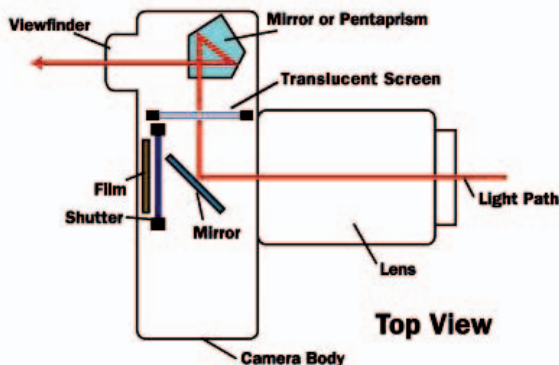
The P&amp;S exposed

Typically, digital P&S cameras have a separate viewfinder and lens, so the subject you see is as your viewfinder sees it and not as the lens (which is usually a couple of inches lower down) does. This may cause a discrepancy in what you thought you shot and the actual picture, especially with close-ups – and this is called the “parallax effect”. Some compact

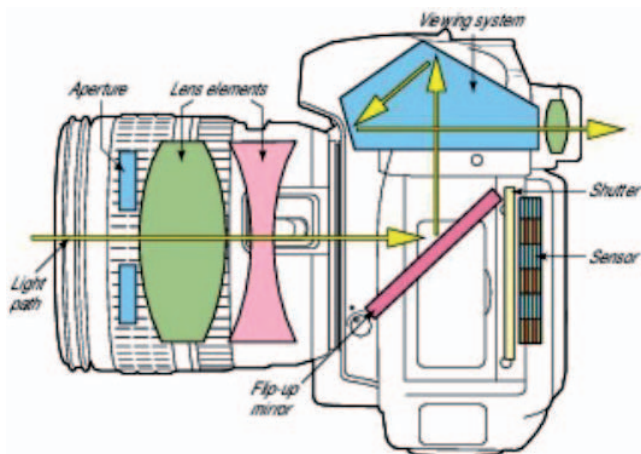
digital cameras have an electronic viewfinder system (EVF) that electronically simulates the effect of the optical TTL viewfinders found on digital SLRs and doesn't suffer from parallax errors. However,



The view you find isn't the view of the camera

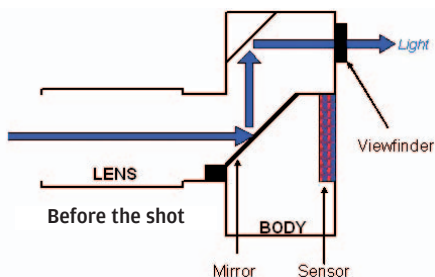


The traditional SLR worked in much the same way, except for the film



Your D-SLR inside out

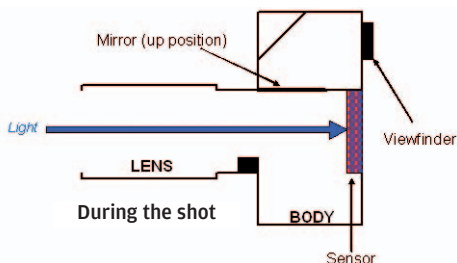
this is far inferior to the optical view finder system in a dSLR. In dSLRs, the image you see through the (optical) viewfinder is the actual image that the sensor of your camera records. This is the Optical Viewfinder system, which allows a through-the-lens(TTL) view of the subject. The reason is a periscope-like mechanism inside (see image). The camera has a slanting mirror situated between the shutter and the lens. Directly above this, in the path of the light that reflects off this mirror is a little piece of translucent glass and a prism known as a 'pentaprism'. Cheaper models also use multiple mirrors known as the 'pentamirror'. The benefit of this design is that you can alter the focus and compose the scene



the way you wish, and get the picture you desire. This is one of the prime reasons that pros go for dSLRs rather than P&S types. Light from the

image bounces off the lower mirror, passes through the translucent glass and into the pentaprism. What the prism does, is invert the

received image on the screen, which, in turn means setting the image straight. This image now is visible to you through your viewfinder, right side up.



### The Shutter Mechanism

When you push down the shutter release on your P&S, the shutter opens up, exposes the sensor to the light for the required duration and shuts again. With the dSLR, however, it's not as simple. As you have seen already, there's a mirror blocking the light from the sensor at the back of the camera. When you click the shutter button, the camera switches the mirror out of the path of the light and directly onto the image sensor (more about sensors later in this chapter). The timer keeps the shutter open for the appropriate exposure and duration. The second shutter then moves in and the mirror flips back into its original position. This can occur as rapidly as ten times in a second, or even faster.

Although, for the split second that your camera takes the picture, the viewfinder blacks out because there is no image being sent through at all, the good thing is that you know exactly what the picture looked like when you took it. Besides, dSLRs come with their own LCD displays too, which show you the photo you've taken, allow you to take another one if you're not happy with the first. Some current models even allow you live preview the way compact digital cameras do, allowing you to verify the focus, framing and depth of field even before you click.

### There are several advantages to the dSLR system:

- a. Shutter lag is minimal, making action and sports photography smoother.
- b. The view is free from parallax.

- c. The picture you take is much brighter when displayed on the LCD screen, as it is electronically amplified in most cameras. The LCD display on a compact digital camera, on the other hand, is virtually impossible to view in daylight.
- d. Although several digital cameras today come with 'super-zoom' (such as the Panasonic Lumix DMC-FZ18.1 Digital Camera with 18x wide angle zoom), the lenses and extensions possible in an SLR cannot be surpassed for their range and picture quality. P&S cameras, typically, do not have lenses that can be changed and do not usually accept filters.
- e. Larger sensors guarantee better resolution for your pictures on a dSLR.

It would be inaccurate to ignore the fact that P&S digital cameras have few pluses of their own, and so, here are some key ones:

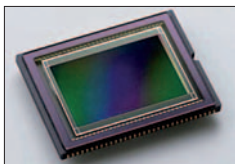
- a. P&S cameras are really low-cost when you compare them to the prohibitive prices of dSLRs. The thing with buying the dSLR is that the lens usually has a separate price tag, not to mention all the other attachments (external flash units, tripods, filters, etc.) you'll need for different occasions.
- b. P&S cameras are light and compact. dSLRs, on the other hand, are bulky, inconvenient and obtrusive to people around.
- c. The noise quotient is really high with dSLRs, and we're talking audio here. P&Ss, in comparison, are completely silent.
- d. The Canon Hackers Development Kit (CHDK) is a free software kit that works wonders to enhance the capacities of your digital camera such as faster shutter speeds, longer exposure times, automatic exposure bracketing, etc. This helps to overcome several shortcomings one would notice while comparing with digital SLRs.

The long and short of it is that for all ordinary, day-to-day purposes, the compact digital P&S camera will do just fine. However, if you're hunting wildlife down the barrel of your zoom, trying to capture multiple movements in a sec-

ond, or are looking to win a few awards, opt for the dSLR. One feature that P&S cameras often just don't match up to is the resolution and quality of the photograph taken by a dSLR particularly, if you're keen to blow up the picture to poster size or better. The reason lies deep down in the camera – in the sensor.

## 14.2 Kinds of Sensors

Digital cameras are basically small computers that convert live images into digital files, by detecting photons (light) which hit the face of an electronic image sensor. As it is with film, the sensor is positioned exactly at the focal point/plane of the camera lens. However, unlike film, the sensor never needs to be moved or changed and is fixed in there permanently.



Sensors make more sense than film

### How sensors work

The face of the sensor is made up of millions of tiny 'photosites' – think of them as 'wells' that fill up with light – which are nothing but light-sensitive transistors (semiconductor devices which can amplify or switch electronic signals – and please don't ask us what a semiconductor is). Each individual photosite represents a single pixel and often when manufacturers refer to 'megapixels', they're actually talking about the number of these microscopic photosensitive sensor spots on the face of the sensor.

The sensors themselves are usually quite small – anything from 1/6th to 4/3rd of an inch, typically of the aspect ratio 4:3 (more about aspect ratios later). Even smaller sensors have already been created (such as the Pixelplus 1/10 inch optical format sensor based on 2.2-micron pixel size). The camera creates the image from the array of pixels by scanning each pixel electronically. When the shutter snaps open, a chip inside the camera (the 'image processor') reads the data that the image sensor receives. This little computer then analyses the data from neighbouring pixels to arrive at

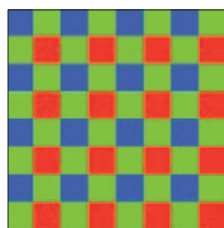
an RGB value for each site. This image is then compiled and displayed on the LCD screen.

The more the pixels on your sensor, the higher the resolution of the image sensor and, thus, the more detailed is the picture. To put the whole pixel thing into perspective, a 6 megapixel camera would give you the same resolution as the best 35 mm film cameras and anything above 8 megapixels will produce pictures that professionals dream of.

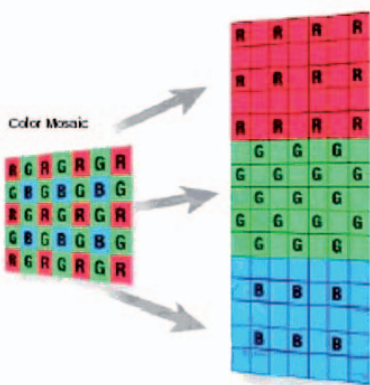
### Sensors and Colour

Sensors only register black and white. To fill the image with colour, it the sensors use a layer of colour filters called a 'colour filter array' (CFA) – either Bayer or Foveon, but usually Bayer when it comes to your typical digital camera. Typically, cameras use separate RGB (Red, Green and Blue, for the uninitiated) colour filter arrays, but some use the CYGM (Cyan, Yellow, Green and Magenta) array. The Bayer filter pattern consists of rows of red and green filters separated by a row of blue and green filters.

Digital cameras most commonly use a 'Bayer mask' over the sensor, which lets the processor figure out the colour. Each square is made of four pixels, one red, one blue and two

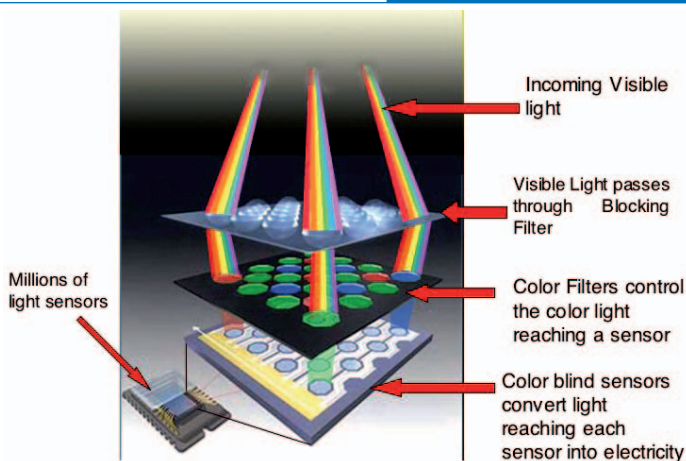


Chequered flag filters



Filters that scatter

green – more greens because our eyes pick up green better than blue or red. The best cameras use three different sensors – each with a different filter, using a 'beam splitter' to deflect the light to the sensors. The same beam of light hits each sensor, but, on account of the filters, each registers a different colour. This, however, needs more space and makes the camera a little



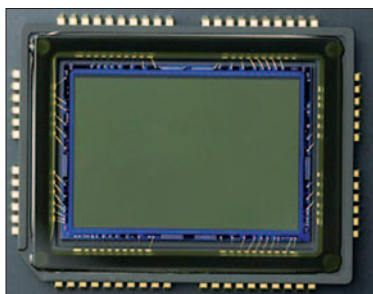
### What lies beneath

unwieldy. Alternatively, a device with separate red, green and blue filters is rapidly rotated in front of a single sensor, recording three different images on the same pixel. The downside here is that the camera takes a little more time to take the picture and if it shakes a little in between the three readings, can lead to an aberrant colour input.

After the camera records the intensity of all three colours, it combines them to create the image as we see it through our eyes. The processor uses a 'demosaicing' algorithm to convert the mosaic-like raw output from the sensor, averaging the value from the closest surrounding pixels to assign the right quantum of intensity and colour to each pixel.

### CCD and CMOS – What's the difference?

The two main types of sensors in all digital cameras today are CCDs and CMOSs. Whether it's the CCD or the CMOS, they both do roughly the same thing – that is, convert light into electrons, read the value of accumulated charge at

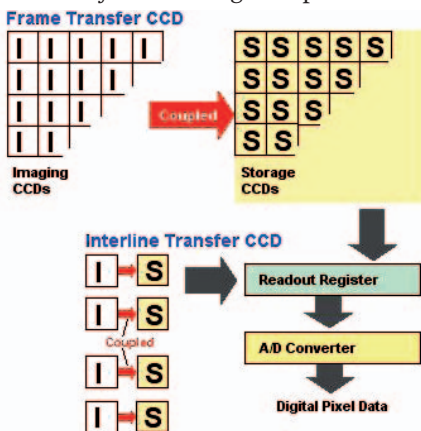


CCDs – sensors that make sense

each pixel and translate and compile this into an image. The difference lies in how they go about doing it.

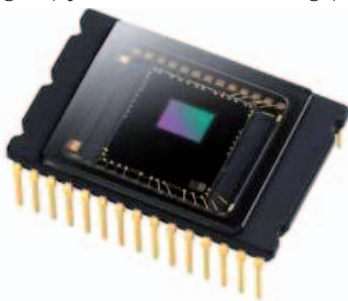
a) CCD sensors: That little P&S you've seen your friend or relative carrying most probably has a sensor commonly known as the CCD – an acronym for Charge-Coupled-Device.

What it's referring to is actually the technology that it uses to convert light to electricity. The reason why it's called 'coupled' is because of its interline architecture. The device is made of an array of imaging pixels and a corresponding array of storage pixels that are lined up or 'coupled' together. Once the imaging array is



Split second binaries

exposed to the light, it instantly transfers the charge to the storage array. This storage CCDs then transport the charge across the chip and it is 'read' by an ADC (Analog to Digital Converter) at one corner of the array. This converts the value (charge) of every pixel into a digital value (zeroes and ones) by gauging the intensity of light (by the amount of charge) at each photosite. The trouble that occurs here is that every alternate line is not an image sensor but a storage strip – opaque. So half of the chip's area is lost for the image. There's another sort of CCD, called the 'frame-transfer' CCD. half of the silicon area of the sensor is covered by an



The CMOS sensor – good things come in small packages

aluminium 'mask'. The image that the sensor receives is immediately transferred from the image area to the opaque one – which is a storage region. So while the image-sensor is being exposed to your next great photo, the processor reads the image slowly from the storage region.

b) CMOS sensors: CMOS imagers, like CCDs, are made from silicon. CMOS, stands for Complementary Metal Oxide Semiconductor – which refers to the process in which the sensor is manufactured rather than its function. The CMOS uses complementary and symmetrical pairs of p-type (electron-accepting) and n-type (electron-losing) semiconductors made of metal oxide, for its logic functions. The CMOS sensor uses several transistors at each pixel to amplify and move the charge to the processor, using conventional wires. The signal it sends is itself, digital, and therefore does not require an Analog-to-Digital converter.

**Both sensors have their pros and cons, some of which we'd like to point out below:**

CCD sensors have been around a long, long time and so have reached a higher level of technical excellence and capacity than the younger CMOS.

Each pixel in a CMOS sensor has several transistors located in it. This hampers the pixels ability to collect the light because several of the photons hit the transistors and miss the photodiode completely.

CMOS sensors therefore, are more predisposed to noise. CCDs, on the other hand, produce images with very minimal evidence of visual noise.

CCDs use a lot of power on account of their process. A CMOS sensor usually consumes very little power in comparison.

CMOS sensors are cheaper in comparison to CCDs because they can be fabricated on almost any standard silicon production line.

A CMOS sensor is larger than a CCD sensor so its surface is capable of capturing more light giving higher quality pictures.

## 14.3 Image Compression

Anybody who's attempted sending across files over the web would know that the bulkier the file, the tougher it gets. Exchanging or saving such files also may encounter difficulties due to their copious size. This is where the format of the data becomes crucial. Luckily for us, there's a whole lot of image-compression software available and universally acceptable in the world today.

File compression basically shrinks files by (a) coding information more efficiently and (b) eliminating redundancies or repetitions. So if, for example, a large part of an image is constituted by a single colour or charge value (like the sky or a grassland), the program reduces it to just a few bytes – some to record the colour and some to record the number of pixels that should be rendered in that colour.

Image compression could be 'lossy' or 'lossless'. Lossless ones (like TIFF) are great for medical photography or high-fidelity image scans but for all general purposes, lossy compression programs (such as JPEG) suit us fine. File compression is pretty effective with photographs because we don't notice the minor loss of detail that results due to the attempt to compress and reduce the bit rate. About 80% of the data in an image file is redundant and can be eliminated through compression. JPEG (Joint Photographic Experts Group) and GIF (Graphics Interchange Format) already use algorithms similar to those used by ZIP compression programs. Thus 'zipping' .jpg files is a bit counterproductive because the program must compress a file that is already compressed. Zipping works best with BMP images but nobody in the whole wide world uses bitmap files to store photographic images for the obvious reason that they're not compressed at all and therefore hog a lot of the disk space.

The most common image formats are TIFF, PSD, BMP, PCX, GIF AND JPEG, some of which we'll discuss here (you'll find the full monty on all these compression formats in Chapter 4 earlier).

**TIFF:** The Tagged Image File Format (now under the control of Adobe systems) is a versatile compressing program which can be compressed or uncompressed and can be stored

at any resolution or bit-depth. TIFF images are preferred for high-quality images such as commercial publishing.

**PSD:** The Photoshop Document file conserves each layer of the file by creating and editing it in Photoshop and other related programs.

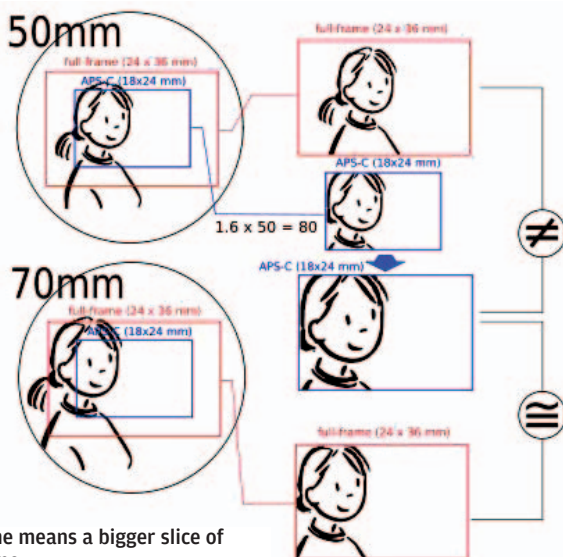
**BMP:** Uncompressed images are stored as raw data. Being a map of bits, these files are cumbersome and not at all suitable for exchange or transmission.

**PCX:** Another popular format for images meant for paper publications, the PCX reduces the size of the file by 2/3rds by palletising colours and reducing the total number to 256.

**JPG:** The Joint Photographic Experts Group developed the .jpg format (pronounced jay-peg) which reduces the detail but maintains the colours using a perception-based compression algorithm.

## 14.4 Full-frame Cameras

Camera size varies in direct proportion to the size of the sensor inside. Image sensors could be either Full-frame sensors



or crop sensors. A full-sensor is the kind of image sensor that is equivalent to a typical 35 mm frame (36x24mm) of photographic film. Virtually all P&S cameras, including some D-SLRs use a frame that is smaller than the 35mm one because its smaller, cheaper to make and leads to cheaper, lighter cameras.

Cameras – like Canon’s DSLRs, which use EOS – 1Ds or EOS-5D full frame sensors (where EOS stands for Electro Optical System) – end up becoming heavier and bulkier because you need better, bigger, hi-tech lenses and a body to match. Point and shoot cameras usually use smaller sensors, typically of a size equivalent to APS-C-size film – significantly smaller than a full 35 mm frame. Smaller sensors record only a part of the image, giving a ‘zoomed in’ effect



Size does matter

‘Full-frame’ also refers to the CCD sensors in which the sensor elements occupy the entire face of the sensor, instead of devoting half the space to storage sites.

A camera is built to suit the needs of the sensor, so a full-frame sensor would need a lens that successfully projects the image on the entire sensor. If the full-frame lens is set on a camera with a small sensor, it just captures the central portion of the image, cropping off the edges. The ratio of the size of the image to the size of the sensor is called “crop factor”, where the reference is usually the 35mm full frame sensor.

Most P&S cameras have a crop factor of 1.3 to 2.0. This is what marks the difference between ‘number of sensor pixels’ and ‘effective pixels’. Some of the cameras lose effective pixels because the camera’s lens can’t cover the entire sensor area and so what you get is actually a picture that’s been cropped all around. At the same time, full frame sensors like the Canon 1D, sometimes lead to a visible fringing – a lateral chromatic aberration – which you’ll need to crop with editing software after the fact. But all said and done, the full frame sensor gives you a wide-angle of view (therefore capturing more of the scene) and a better quality image.

## 14.5 Sensor size and image resolution

Cameras with smaller sensors use shorter focal length lenses to get the same angular coverage as cameras with larger sensors do with longer focal length lenses. So what’s the big deal about sensor size, then? The size of the sensor affects many factors in the image and the functions of the camera and its body. Basically, sensors are available in three different sizes : four thirds, APS and Full Film Format.

Sensor Resolution Table									
Sensor	Ratio	Resolution	File Size	Printed Sizes					
size	format	height x width	Mb's	6"x 4"	7"x 5"	8"x 6"	10"x 8"	A4	A3
24.8mp	3x3	6104 x 4064	74.4mb	1032ppi	842ppi	720ppi	559ppi	507ppi	358ppi
21.1mp	3x2	5616 x 3744	63.3mb	936ppi	775ppi	663ppi	514ppi	466ppi	333ppi
16.7mp	3x2	4992 x 3328	50.1mb	832ppi	689ppi	589ppi	457ppi	414ppi	303ppi
14mp	3x2	4560 x 3024	42mb	760ppi	627ppi	512ppi	417ppi	377ppi	270ppi
12mp	3x2	4288 x 2848	36mb	712ppi	590ppi	505ppi	392ppi	355ppi	255ppi
10mp	3x2	3872 x 2592	30mb	646ppi	535ppi	458ppi	355ppi	322ppi	230ppi
8mp	4x3	3264 x 2448	24mb	578ppi	477ppi	408ppi	316ppi	287ppi	211ppi
6mp	3x2	3008 x 2008	18mb	501ppi	415ppi	355ppi	275ppi	249ppi	179ppi
5mp	4x3	2560 x 1920	15mb	453ppi	374ppi	320ppi	248ppi	225ppi	161ppi
4mp	4x3	2240 x 1680	12mb	396ppi	328ppi	280ppi	217ppi	197ppi	141ppi
3mp	4x3	2048 x 1536	9mb	362ppi	299ppi	256ppi	198ppi	180ppi	129ppi

Making sense of sensor resolution

### Effects of Sensor Size on the image

The sensor with the larger individual pixels will record the light it receives with greater precision than those with smaller pixels. Larger the sensor, larger are the pixels on it, implying that they are more receptive and sensitive to light and can therefore produce more detailed images.

An 8 megapixel Point and Shoot camera has the same number of pixels as an 8 megapixel DSLR camera. But the DSLR has a larger sensor with larger pixels than the teeny-weenie sensor on your point and shoot.

These pixels can collect more light, recording the highs and lows of the intensity of light at each pixel more accurately, reducing noise and bettering detail and image quality.

Being more sensitive to light, the larger image sensor can give you much better pictures in low light conditions than the standard P&S ones.

If the sensor is smaller than actual requirement, then the camera is unable to capture the full view of the image.

The smaller the sensor the more the pixels have to be crammed into the space available. Diffraction, that is the spreading of light when it passes through an aperture, spoils the image, leading to 'noise'.

Noise level is directly connected to the actual size of the pixels on a sensor and while several noise reduction techniques are being used in modern digital cameras, the fact remains that larger sensors are liable to produce less noisy photographs. The downside here is that as the pixel size increases, so does the size of the file – thus requiring more memory space to be stored in – and longer processing time.

A large sensor, however would give the same resolution as a small one if both of them have the same number of pixels. Pixel size does not affect resolution, which remains constant for the sensor count.

A 3-megapixel sensor, for example, would give you the same result, whatever the size of the sensor – whether it's the little digicam type or the big DSLR one.

It's the size of the pixels that makes all the difference. The table would help to elucidate what we've been talking about.

## Conclusion

That about wraps up this Fast Track to Digital Photography, but hold on a minute. You may have figured out the digital camera, back to front and in and out but none of it will really sink in until you grab that digital camera, set out into the world, juggle the f-stops, zoom around, and go photoshopping and flickring. Nothing beats the real thing. So now that you've got the theory in you head, put your hand to practice. Happy shutterbugging.

# Glossary

**360 degree panorama:** A complete, gapless panorama that forms a cylindrical image around the point of view.

**AA Batteries:** The standard batteries for many digital cameras. NiCd and NiMH variants are rechargeable.

**ATA:** A standard for storage devices that makes the system treat them as hard drives.

**Accessories:** A variety of additional equipment to be used with a camera.

**Adapter:** A device to allow small storage devices to be read by slots in a machine or card readers.

**Album:** A collection of photographs, can be digital or real.

**Ambient Light:** The natural lighting conditions that are prevalent at a scene.

**Anti-Static cloth:** A bit of fabric that prevents the accumulation of static energy.

**Aperture:** The opening through which the diaphragm allows light into the camera.

**Artefact:** A blemish on the image.

**Aspect Ratio:** The ratio of the horizontal to vertical dimensions of the image.

**BMP:** A bitmap image format.

**Battery:** The source of energy for the camera. Can be standard or proprietary.

**Bayer Pattern:** One of the patterns in which colour specific photocells are arranged on a sensor.

**Bitmap:** An image made up of an array of pixels, with each pixel being of a particular colour or shade of grey.

**Black and White:** A photograph without any colour, using different shades of grey from black to white.

**Blade:** The units on a diaphragm.

**Blurry:** An indistinct, unclear or fuzzy image primarily due to movement of the subject or the camera.

**Bracketing:** Taking a series of shots with different settings of the same subject from the same position.

**Brackets:** The photos taken in a bracketing operation.

**Brightness:** The intensity of light in an image, ranging from dark to light.

**CCD:** Charged couple device — one of the two main types of image sensors used in cameras. This is the component that detects photons and produces the captured electrical signals.

**CCD raw format:** The image collected by the sensor before algorithms are implemented by the camera to produce the finished image.

**CD:** Compact disk, a standard medium of storage for data.

**CMOS sensor:** Complementary metal oxide semiconductor (CMOS) sensors are now being used in cameras. These use positive or negative polarity circuits, and require comparatively less energy.

**Camera:** A light-sealed device with a small aperture for light that imprints images on a sensor or film when exposed.

**Camera Angle:** The angle of the camera lens with reference to the subject.

**Card:** A memory card, portable memory for the camera.

**Card Reader:** A device that reads the memory stored in a card.

**Charged-coupled device:** See CCD

**Click:** The act of taking a picture, opening the shutter in the camera.

**Clicker:** A device that springs the shutter without using the default camera button, but by using a cable. Used for control and to reduce shakes.

**Colour Correction:** The process of digitally tweaking the representation of colours in an image to enhance it.

**Colour Space:** The range of colours, or the colour model used in a particular image or camera. Popular colour spaces include RGB, CMYK and HSL.

**Colour depth:** Also known as bits-per-pixel, this is the memory space allocated to each pixel in a digital photograph. The colour depth may range from 1-bit monochrome images to 24-bit true colour images and beyond.

**Composition:** The arrangements of forms and elements within the frame.

**Compression:** Algorithms used to reduce the filesize of an image.

**Contrast:** The difference between the highlights and shadows in an image, or the darker and lighter portions.

**Cropping:** Cutting off an edge or multiple edges of a photo is called cropping.

**DPI:** Dots-per-inch, a measure of the resolution of a printer using the density of the ink used.

**Demosaicing:** The process of extracting an image from the raw data in the sensor for further processing.

**Depth of field:** The distance between the nearest and farthest points in focus.

**Diameter of Aperture:** The degree to which the diaphragm in a shutter opens, allowing light to enter the camera.

**Digital Zoom:** Artificial zoom in a camera, analogous to cropping.

**dSLR:** A digital SLR camera. Uses a digital image sensor instead of a negative film.

**Docking Station:** A unit for connecting the camera to a system and charging it at the same time. Serves as a stand for converting the camera into a webcam in some models.

**Drivers:** Software that allows the computer to interface with the hardware.

**Durability:** The resistance to damage from environmental factors and physical strain during use.

**EXIF:** The information about the photo stored within an image file. EXIF data includes camera model, exposure, aperture, etc.

**Edges:** The region of distinction between objects and elements within a photo.

**Embed:** To insert an object in an application without making any changes to the application. Changes made to the application do not affect the object.

**Exposure:** The action of exposing the film or sensor to light.

**Exposure Value:** Numbers which indicate combinations of aperture and shutter speed.

**Exposure compensation:** The function of adjusting upwards or downwards the exposure value that would be automatically used by a camera in particular lighting conditions.

**Exposure lock:** The process of half-clicking in traditional SLRs, where the same settings are used when the camera angle is changed and clicked.

**f-number:** A measure for the diameter of the diaphragm. Also known as the f-ratio or the relative aperture. Divide the focal length by the diameter of the aperture to arrive at the f-number.

**Fill Flash:** A flash used to fill in the darker areas of a photo.

**Film:** Photosensitive strips, also known as a negatives, used in traditional cameras.

**Filter:** A filter can mean a preset set of commands in a photoediting application, a physical accessory to the lens of the camera, or a set of algorithms implemented in a camera to process an image.

**Flash:** A light source that emits a brief burst of light.

**Flash Sync:** Synchronising the firing of the flash at the precise moment of time when the shutter is open.

**FlashPix:** An image format that stores the same image in multiple resolutions, with each image being independently editable and even drastically different at different resolutions.

**Focal plane:** The plane in which the lens focuses an image.

**Focus:** The process of bringing an object into sharp focus.

**Focus Lock:** Using the half-click on traditional SLR cameras to use the focus of one scene on another.

**Frame:** The photographer's determination of where the edges of an image will be.

**Frame grab:** Making an image out of a single frame in a video.

**Frame rate:** The number of frames in a video per unit of time.

**f-stop:** The aperture settings used to take an image.

**GIF:** Graphic Interface Format. A common format for animated images; often used on the internet.

**GUI:** Graphical User Interface. A visual depiction of functions in software using icons and workspaces.

**Grainy:** An image consisting of a lot of closely textured and clearly visible grains.

**Grey market:** Products from the grey market are available at lower prices than the market, but the origins are dubious and the products may be without warranty.

**Greyscale:** An image made up of black, white and different shades of grey.

**Grid:** A set of vertical and horizontal rules on an image, typically overlaid in image editing software.

**Guide number:** The rating of the power of flash.

**HDR:** High-Dynamic Range. A photo that has clearly defined shadows, mids and high tones, typically taken using bracketing procedures and combined from at least three images taken using different exposures.

**Histogram:** A graph of different light frequencies in an image.

**Hot Shoe:** A clip on top of a camera for attaching the flash.

**Hue:** The hue is one of the three defining properties of colour used in a colour scale (the others are saturation and lightness), it is the untainted colour, without any lightness or darkness.

**IEEE 1394:** A port on the computer for rapid data transfer.

**IS:** Image Sensor, a solid-state device that captures an image on exposure.

**ISO Rating:** The value of ISO in a capture, ranges from 25 to 2000 and above.

**ISO speed:** See ISO Rating.

**Image Stabilisation:** Mechanical, electronic or digital measures taken to reduce blurring of an image due to the shaking of the camera.

**Image parameters:** A number of attributes of an image, may range from colour tone, hue, saturation, vibrancy and others.

**Infrared:** All sub-red frequencies in the electromagnetic spectrum. Used for low-light photography. Gives a greenish or sometimes bluish tinge to photos.

**Interface:** An on-screen appearance of the firmware in the camera or software on the computer.

**Interpolation:** The process of creating a larger image from the data captured by the sensor.

**Inverse square law:** A physical law relevant to camera flashes, used to judge the strength of flash at a distance. The illumination from the flash falls by a factor of four for every doubling of distance from the flash.

**IrDA:** A standard for transferring data over infra-red.

**JPEG:** A popular digital camera file format that uses lossy compression, developed by the Joint Photographic Experts Group.

**Kelvin:** A unit to measure the colour temperature of lighting in a scene.

**LCD:** Liquid Crystal Display, the most commonly used device for digital camera displays, which act as a convenient viewfinder.

**LZW:** Lempel-Ziv-Welch, a compression standard for images.

**Landscape:** Horizontal photographs of a layout of land.

**Lens:** One or more glass fixtures to focus an image on the sensor or negative.

**Lossless compression:** A method for compressing and storing images but without losing any image data, produces large file sizes for proportionally larger images.

**Lossy compression:** A method for storing images where image information is lost with consecutive saves. There is a quality mode, that can produce low file sizes for large images.

**Macro:** Close-up photography.

**Manual Override:** Taking manual control of focus, exposure, aperture, shutter speed and other camera settings. Can be partial or total.

**Megapixel:** One million pixels

**Memory:** The external or internal storage for a digital camera, where the pictures are stored. Can interface with a computer through a card reader, or directly from the camera through a cable.

**Memory Space:** The free space in the external storage used for

the camera.

**Metering:** The act of measuring the amount of light to calculate the exposure.

**Microns:** A unit of length one millionth of a metre.

**Mirror:** Used behind the lens of an SLR camera to direct the light to the viewfinder.

**Mosaic:** A grid of small elements, usually pixels or elements in digital photography.

**Multiple Exposure:** Capturing multiple images on the same frame or negative, opening the shutter a number of times for taking a single image. Used to capture objects in motion, such as the path of the sun across the sky.

**Negatives:** A roll of film with images imprinted on them, used to develop pictures. A digital equivalent is the raw data from the sensor before it has been processed.

**NiCd battery:** Nickel-cadmium battery.

**NiMH battery:** Nickel Metal Hydride battery. Ecologically safe and very efficient.

**Optical Resolution:** The degree to which detail is resolved in an image.

**Optical Viewfinder:** The viewfinder is a small window used for framing the image.

**Optical Zoom:** A mechanism for adjusting the focal length of a lens.

**Orientation Sensor:** A sensor in the camera that adjusts the orientation of the image according to the angle in which the camera is held.

**Overexposed:** An image that has a large portion in highlight, with detail lost in these areas. An image that appears unnaturally bright.

**P&S:** Point and Shoot, a regular digital camera.

**PAL:** The European standard for video broadcast.

**PC Card:** A card that plugs directly into a notebook or handheld devices. A common storage device.

**PCX:** One of the earliest file formats for storing raster images.

**PNG:** Portable Network Graphic, a commonly used file format on the internet and on Linux systems.

**PSD:** The default format for Adobe Photoshop, an image editing software.

**Panorama:** A series of images stitched together to form a continuous landscape.

**Parallax:** The difference in the point of view from the viewfinder and the lens. An SLR camera has zero parallax.

**Parallel port:** An interface for computers to connect auxiliary and peripheral devices.

**Pentamirror:** Three mirrors instead of a pentaprism to correct the inverted images in SLR cameras.

**Pentaprism:** A five sided prism that redirects light by a 90 degree angle, used in SLR cameras.

**Perspective:** The spatial positioning or angle of elements and forms in an image, with reference to the eye or lens.

**Photoshopping:** Editing an image on Photoshop.

**Pixel:** An element on a sensor, or a single unit of colour rep-

resentation on a monitor.

**Pixelation:** This effect occurs when the resolution of the image is smaller than the resolution of the monitor, when fewer digital pixels are spread out over many real pixels.

**Portrait:** An image of a person or people.

**Preset:** A set of functions, algorithms or camera settings that are programmed into the camera and accessible through buttons or the menu.

**Preview Screen:** A small LCD screen at the back of the camera, used to preview images in cameras. Acts as a viewfinder for non-SLR digital cameras.

**Prism:** A transparent glass device that refracts or redirects light.

**RAW:** A variety of image formats, the data received directly from the sensor.

**RGB:** An additive colour model, used for display or projection. Colours are made by adding two or more colours together.

**Red-eye:** A visual artefact where the eyes of a person appears red because of flash reflecting off the retina.

**Red-eye reduction:** A feature in image editing software that removes red eyes.

**Render:** The process of creating an image from a description or algorithm.

**Resolution:** The level of detail in an image.

**SLR:** Single-lens reflex camera, a camera with zero parallax.

**Saturation:** The purity of a colour. Fully saturated colours have no grey in them.

**Scan:** The process of converting a printed image to a digital image by using a scanner.

**Sepia:** A reddish brown tinge that old prints using a particular chemical process acquired over time.

**Sharpness:** The edge contrast of an image is its sharpness.

**Shoot:** The act of capturing an image on the camera.

**Shutter:** A device that opens, closes and controls the exposure.

**Shutter Speed:** The length of time light is allowed to go through an open shutter.

**Shutter lag:** The time between clicking the button and the shutter opening.

**Shutter release:** The clicker, or any mechanism that opens the shutter.

**Shutter priority:** An automatic exposure system in which you set the shutter speed, and the camera selects the aperture for the correct exposure.

**Speed:** The same as shutter speed, the total duration of the exposure.

**Stitching:** Combining the edges of a number of photographs to form a panorama.

**Stop down:** To increase the aperture, or reduce the f-stop.

**TIFF:** A lossless image standard for saving image files digitally.

**TTL:** Through-the lens, a system in which the flash is metered through the lens in order to determine how long the flash light should be discharged.

**Tags:** Short, descriptive words for a photo, saved digitally or by a software index. Used massively on the internet for filtering and tracking photos.

**Telephoto lens:** A lens with very long focal length.

**Telescopic:** Analogous to zoom.

**Thru-the-lens:** See TTL

**Time Lapse:** A series of photos with a delay in time of the same subject, usually in motion or changing over time.

**Timer:** An mechanism where the exposure is delayed by a specified duration after the click.

**Tone:** The warmth or coolness of an image, that is indicative of the amount of reddish or bluish colours it contains.

**Trigger:** A mechanism for clicking without moving the camera or using the click.

**Tripod:** Typically a three-pronged stand for holding the camera steady.

**Underexposed:** A dark image, in which not enough light was captured, resulting in too much detail being lost in the shadows.

**Vividity:** The apparent vibrance of the colour, an image with a high contrast.

**Washed out:** A bland image where details are hazy.

**White Balance:** The representation of white by the camera, all other colours are mapped to this reference. Changes dramatically with lighting conditions.

**Wide-angle lens:** A lens with a short focal length, used to capture large vistas.